



## Effectiveness of Early Literacy Instruction: Summary of 20 Years of Research

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See <https://go.usa.gov/x6trG> for the full report.

### Appendix A. The search, screening, and review process

This appendix describes the literature search, screening, and review processes used in this report.

#### *Literature search methodology*

A comprehensive list of keywords was compiled from several sources including the National Early Literacy Panel and the What Works Clearinghouse (WWC) early childhood education topic area protocol (National Early Literacy Panel, 2008; What Works Clearinghouse, 2014). Four categories of search terms (target ages and settings, study design, interventions, and outcomes) were included and combined in each electronic database using the Boolean operators OR between search terms within each category and AND between sets of search terms comprising the four categories (boxes A1–A3) to identify peer-reviewed and grey literature. The interventions search term category contained three subcategories—general terms, curricula, and instructional practices—that each contain search terms linked by the Boolean operator OR within and across subcategories. The outcomes search term category contained six subcategories—language, phonological awareness, print knowledge, decoding, early writing, and general literacy—that each contained search terms linked by the Boolean operator OR within and across subcategories.

These terms were used to search the following databases: Child Development and Adolescent Studies, EconLit, ERIC, ProQuest Dissertations, and PsycINFO. The study team also conducted a hand search for additional relevant articles from the 2016 and 2017 issues of several prominent research journals, including *Child Development*, *Developmental Psychology*, *Early Childhood Research Quarterly*, *Early Education and Development*, *Journal of Educational Psychology*, *Journal of Learning Disabilities*, *Reading Research Quarterly*, *Scientific Studies of Reading*, and *Topics in Early Childhood Special Education*.

In addition, the reference lists from WWC intervention reports that used any of the WWC early childhood education review protocols (What Works Clearinghouse, 2005, 2009, 2010, 2014), research syntheses produced by the Institute of Education Sciences and other agencies, and meta-analyses were searched and cross-referenced with the results of the literature search to identify additional studies not captured in the initial search.

The references of 60 meta-analyses and literature reviews were examined and cross-referenced with the results of the literature search to identify additional studies that might not have been captured in the initial search. This process resulted in identifying some 150 additional studies. The meta-analyses and literature reviews were Al Otaiba and Fuchs, 2002; Al Otaiba et al., 2009; Allen, 2016; Anderson et al., 2003; Blok, 1999; Blok et al., 2005; Bowers et al., 2010; Breit-Smith et al., 2009; Burger, 2015; Burger and Winner, 2000; Burne et al., 2011; Bus and Van IJzendoorn, 1999; Camilli et al., 2010; Chambers et al., 2016; Chambers et al., 2010; Chambers et al., 2006; Christ and Wang, 2011; Connor et al., 2014; Darrow, 2009, 2010; Diamond et al., 2013; Ehri et al., 2001; Elleman et al., 2009; Filiatrault-Veilleux et al., 2015; Fukkink and Lont, 2007; Graham et al., 2018; Guo et al., 2016; Hosley, 2000; Hsin et al., 2014; Jalongo and Sobolak, 2011; Kelchen et al., 2011; Kunkel, 2015; Lankshear and Knobel, 2003; Lee et al., 2015; Lin, 2013; Ma et al., 2014; Magnuson et al., 2016; Markussen-Brown et al., 2017; Marulis and Neuman, 2010; McCoy et al., 2017; Mol et al., 2009; Moses, 2008; National Early Literacy Panel, 2008; Neale and Pino-Pasternak, 2017; Nelson et al., 2003; Odom and Strain, 2002; Petersen, 2011; Piasta and Wagner, 2010; Pidano and Allen, 2015; Reynolds et al., 2011; Schweinhart, 2001; Standley, 2008; Suggate, 2016; Swanson et al., 2011; Takacs et al., 2014; Towson et al., 2017; Walker, 2011; Wasik et al., 2016; Zauche et al., 2016; and Zucker et al., 2009.

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#### **Box A1. Keywords used for the target ages and settings and the study design search categories**

Target ages and settings	Study design	
3 year* old	Three-year-old*	Multi-element design
3-year-old*	Toddler*	Multiple baseline
3 year	Young child	Multiple baseline design
4 year* old	Young children	Multiple probe
4-year-old*	Preschooler	Multiple-probe
4 year	Preschoolers	Posttest
5 year* old		Post-test
5-year-old*	Study design	Post test
5 year	ABAB design	Predict*
Age*3	Alternating treatment	Prediction
Age*4	Assignment	Predictive
Age*5	Baseline	Pretest
Child care*	Causal*	Pre-test
Childcare	Causality	QED
Day care	Changing criterion design	Quasi experimental
Daycare	Comparison group*	Quasi-experimental
Day-care*	Control group*	Random*
Early childhood*	Effect*	Randomization
Early experience	Effective	Randomized Control* Trial
Five-year-old*	Effectiveness	Randomized controlled trial
Four-year-old*	Efficacy	Randomly assign
Home school*	Efficiency	RCT
Infant*	Evaluation	RDD
Infantile	Experiment	Regression discontinuity
Nurseries	Experimental	Reversal design
Nursery	Impact	Simultaneous treatment
PreK*	Intrasubject replication design	Single case design
Pre-K	match	Single subject design
Prekindergarten*	Literature review	Single subject experimental design*
Pre-kindergarten*	Matched group*	Systematic review
Preschool*	Meta analysis	Treatment
Pre-school*	Meta-analysis	Withdrawal design
	Multi element design	

\* indicates a wildcard character.

Source: Authors' compilation.

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**Box A2. Keywords for the interventions search category, by subcategory**

General terms	Curiosity Corner	Ready, Set, Leap!
Approach*	Daisy Quest	Reggio Emilia
Basal reading	DARE to be You	Rigby's Activate Early Learning
Courseware	Direct Instruction	Saxon Early Learning
Curricula*	DLM Early Childhood Express	Scholastic Early Childhood Program
Curriculum	Doors to Discovery	School Readiness Express
Early childhood education	Early Childhood Program	Sing, Spell, Read, & Write Sound Foundations
Early intervention	Early Literacy and Learning Model (ELLM)	Smart Start
Educational method*	Fast ForWord Preschool	Sound Foundations
Educational strategy	FunShine Express: Fireflies/Sprouts	Sounds Abound
Educational strategies*	Funsteps, Inc.	Spell, Read, PAT
Educational therapy	Growing Readers Early Literacy Curriculum (High/Scope)	S.P.A.R.K.
Emergent	Headsprout Reading Basics	Stepping Stones to Literacy
Initial teaching alphabet	High Reach	Storytown
Instruct*	High/Scope Curriculum	Tools of the Mind
Instruction	Houghton Mifflin PreK	We Can! Curriculum
Intervene*	Innovations Comprehensive Preschool Curriculum (Gryphon House Pub.)	Waterford Early Reading Program
Intervention	Interaction Approach	Pre-K
Language experience approach	Journeys into Early Literacy	Wee Learn
Learning*	Kaplan Planning Guide to the Preschool Curriculum	Words and Concepts
Literacy*	Ladders to Literacy: A Preschool Activity Book	<b>Instructional practices</b>
Monitor*	Language for Learning	Book reading
Practice*	Language-Focused Curriculum	Classwide peer tutoring
Program*	Leap	Conversational-recasting
Reading*	LeapDesk Workstation	Conversation-based language intervention
Remedial*	Learning Experiences: An Alternative Program for Preschoolers and Parents (LEAP)	Dialogic reading
Remediation	Learninggames—Abecedarian	Direct instruction
Strategy*	Let's Begin with the Letter People	Explicit attention to articulation
Teacher*	Lidcombe Program	Family literacy
Teaching	Lindamood Phoneme Sequencing Program (LiPS)	Functional communication training
Technique*	Links to Literacy Curriculum Kit	Graphics-based software tools
Therapeutics*	Literacy Express	Home literacy
Therapy training	Marazon system	Imitation-based language intervention
Train*	Montessori Method	Individualized reading
Transfer	My Magic Story Car	Interactive shared Book Reading
Treat*	Open Court Reading (OCR) Pre-K	Interactive shared picture book reading
<b>Curricula<sup>1</sup></b>	Open Court Reading Program	Letter knowledge training
The Abecedarian Project	Opening the World of Learning	Peer training
A Beka	Pebble Soup	Peer-mediated intervention
Active Learning	Phonemic Awareness in Young Children: A Classroom Curriculum	Phonological awareness training
Bank Street Developmental	Phono-Graphix	Phonological awareness training plus letter knowledge training
Beyond Centers and Circle Time	Primrose Schools	Picture book reading
Breakthrough to Literacy	Project Approach	Pragmatic teaching
Bright Beginnings	Project Construct	Reciprocal teaching
Building Blocks for Literacy	Read, Play, and Learn!	Redirect
Building Early Literacy and Language Skills (BELLS)	ReadingLine Kits	Repeated reading
Building Language for Literacy (BLL Scholastic)		Self-initiated augmentative communication treatment
Compass Learning Odyssey Pre-K/K Computer Assisted Instruction		Shared book reading
Core Knowledge Preschool Sequence		Stimulus control procedure
Creative Curriculum		

Storybook reading	Teaching story grammar knowledge	Verbal labeling responses
Sustained silent reading	Teaching-script	Video discourse intervention
Syntax program	Text-based software tools	Written text cueing
Teaching phonological awareness	Time delay	
Teaching rhyming		

1. These curricula represent commercial products that have been identified by the What Works Clearinghouse (WWC). The WWC website includes intervention reports for some of these curricula, but approximately 71 percent have not been updated in the past 10 years, as of June 28, 2017.

\* indicates a wildcard character.

Source: Authors' compilation.

### Box A3. Keywords for the outcomes search category, by subcategory

Language	Speech	Rhyme oddity
Cohesive adequacy	Spoken language	Rhyme production
Communicate	Story	Rhyming
Communication	Story grammar	Rime
Comprehend	Subvocal	Segment*
Comprehender	Syntactic	Segmentation
Comprehension	Syntax	Sound*
Comprehension monitoring	Text structure	Syllable*
Context clue	Vocabulary	Syllable blending
Discourse skills	<b>Phonological awareness</b>	Syllable elision
Expressive	Alliterate	Vowel*
Following direction	Alliteration	Word blending
Grammar	Alliteration matching	Word completion
Grammatical	Alliteration oddity	Word elision
Language	Blend*	<b>Print knowledge</b>
Language sample analysis	Blending	AK
Lexical	Compound	Alphabet*
Lexical diversity	Consonant	Alphabetical
Listen	Delete*	Book concepts
Listening	Deletion	Concept of word
Mean length of utterance	Elision	Concepts of word
Metalinguistics	Final phoneme elision	Concept*
MLCU	Final sound	Concept about print
MLU	Initial sound	Concepts about print
Morpheme	Medial sound	Concept of print
Morphological	Onset	Concepts of print
Morphology	Onset rime blending	Convention of print
Naming	Onset rime	Conventions of print
Narrative	PA	Directionality
Oral language	Phoneme	Environmental text
Picture vocabulary	Phoneme blending	Environmental*
Pragmatics	Phoneme blending into nonwords	Left-to-right orientation
Productivity	Phoneme blending into words	Letter case
Prosody	Phoneme elision	Letter identification
Psycholinguistics	Phoneme isolation	Letter knowledge
Recall	Phoneme manipulation	Letter name
Receptive	Phoneme segmentation	Letter names
Retell	Phoneme substitution	Letter naming
Schema theory	Phonemic	Letter recognition
Semantics	Phonetic	Letter retrieval
Sentence completion	Phonological	Letter sound
Sentence recalling	Rhyme*	Letter sound correspondence
Sentence structure	Rhyme matching	Letter sounds
Sociolinguistics		

Letter-sound	Phoneme-grapheme	Signature
Letter-sound correspondence	correspondence	Spell*
Lowercase letter	Phonetic	Spelling
Phoneme grapheme correspondence	Phonic	Symbol
Phoneme-grapheme correspondence	Phonics	Write
Print awareness	Phonology	Writing
Print*	Structural analysis	Writing ability
Punctuation	Syllable*	Writing achievement
Sight*	Vowels	Writing development
Sound letter	Word list	Writing expression
Sound*	Word lists	Writing fluency
Sound-letter	Word reading	Writing name
Uppercase letter	Word recognition	Writing readiness
Word	Word*	Written composition
<b>Decoding</b>	<b>Early writing</b>	<b>Written expression</b>
Consonant*	Composition	Written production
Decode*	Dictation	<b>General literacy</b>
Decoding	Direction	Academic
Grapheme*	Dot	Achievement
Letter sound correspondence	Emergent writing	Combined score
Letter-sound correspondence	Encode	Composite score
Morpheme*	Encoding	Early childhood
Morphological	Invented spelling	Early*
Morphophonemic	Letter writing	Language arts
Orthograph*	Line	Lexical*
Orthographic	Linearity	Lexicology
Orthography	Mark	Literacy
Pattern recognition	Message	Literacy*
Phoneme*	Morphophonemic	Readiness
Phoneme grapheme correspondence	Name writing	Reading*
Phoneme grapheme correspondence	Orthographic*	Total score
	Scribble	
	Scribbling	

\* indicates a wildcard character.

Source: Authors' compilation.

### ***Screening process and study eligibility criteria***

The study abstracts and full reports of the 74,001 unique studies identified through the literature search were screened for eligibility. Studies that were eligible for review met the following relevancy criteria:

- ***Study design.*** Studies must have used a randomized controlled design, quasi-experimental design, or a single-case design.
- ***Publication date.*** Studies must have been published between January 1, 1997, and December 31, 2017.
- ***Sample.*** Studies must have included a student sample that met the following criteria:
  - ***Preschoolers.*** Children ages 36–71 months (that is, at least 3 years, 0 months old and not yet 6 years, 0 months old) who had not yet entered kindergarten and who were receiving school-, center-, or home-based instruction delivered by a practitioner (for example, school- or center-based personnel, a speech-language pathologist, or a paraprofessional). The review did not include studies that contained children in kindergarten unless the study findings disaggregated the results for preschool children or preschool children represented at least 60 percent of the children in the sample. Studies that provided children's

ages but not grade levels were reviewed when the mean age of the children in the sample was greater than 36 months and less than or equal to 60 months.

- *General education students.* At least 50 percent of the children in each study were general education students and were not classified as an English learner student or a student with disabilities (children with a speech or language impairment were eligible for inclusion).
- *Location of the intervention.* The children must have attended a program in a country that is similar enough to the United States that the study could be replicated in the United States (for example, in which English is the predominant language).

### ***Intervention types***

The interventions considered for inclusion must have had a goal or goals of enhancing language, phonological awareness, print knowledge, decoding, early writing, or general literacy performance (see definitions below); the interventions could have had goals outside these domains as well. For example, a program that teaches language and math was eligible for inclusion because one of its goals is language. Interventions must have been implemented in a school- or center-based setting (for example, a child care center, school- or community-based preschool, or other center-based early childhood setting) and delivered by a researcher or practitioner (for example, school- or center-based personnel, a speech-language pathologist, or a paraprofessional). Interventions implemented in a home-based setting or a clinic (for example, a speech-language pathology clinic) were excluded. At least 75 percent of the language used during instruction must have been in English to be included. The program might have included other components (for example, parent training, education), but only curricula and instructional practices that fit the criteria above were included. Figure A1 demonstrates the decision tree for categorizing intervention type.

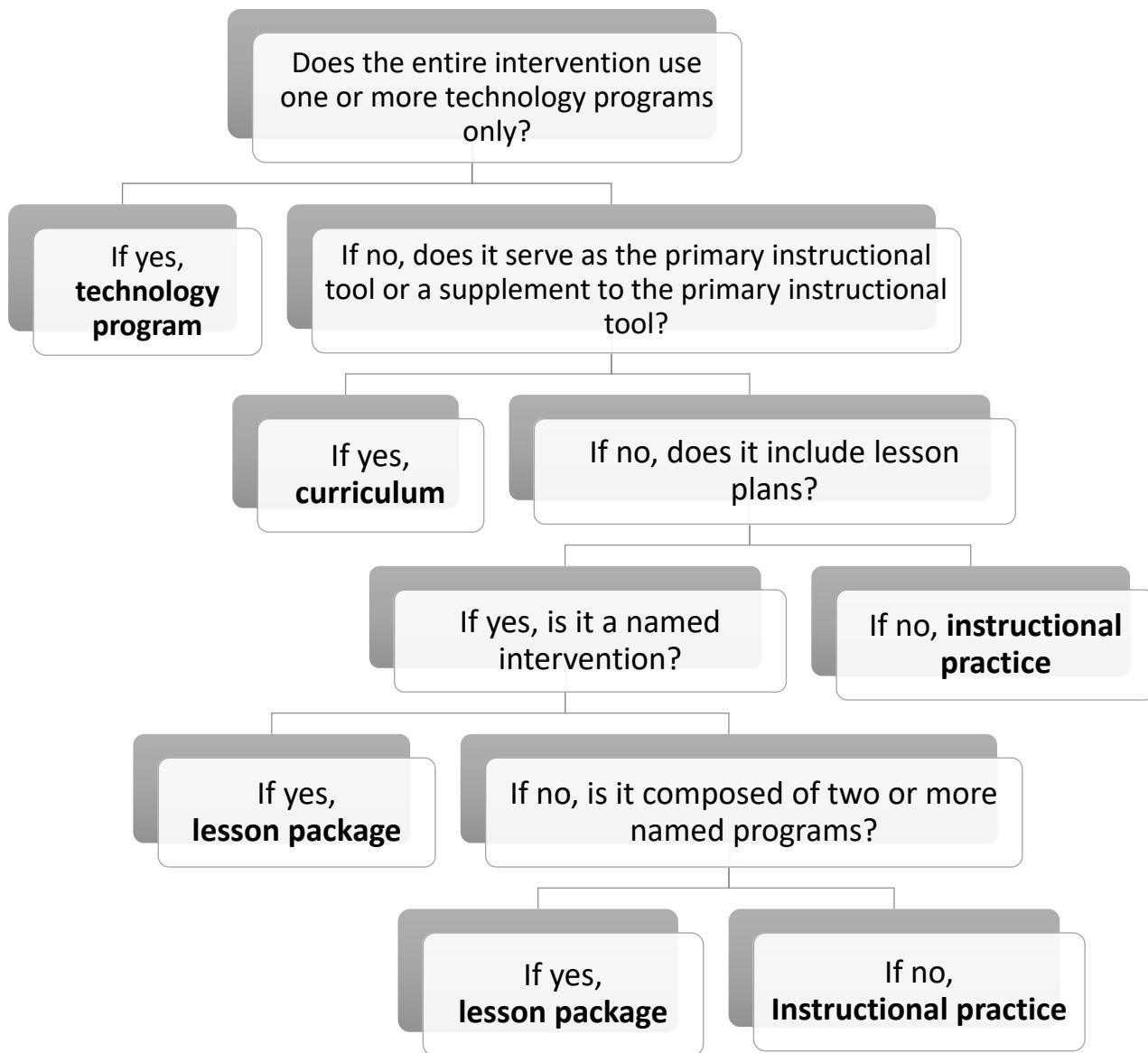
Definitions and inclusion criteria for each intervention type are as follows:

- *Curriculum.* A set of activities, materials, or guidance for working with children that serves as the primary instructional tool designed to meet children’s learning needs in multiple areas (for example, Creative Curriculum) or that is designed as a supplement to the primary instructional tool (for example, At risk Tier 2: Developing Talkers). A curriculum could—but did not have to—have a clearly identified name and included home-based programs delivered by a practitioner (for example, school- or center-based personnel, a speech-language pathologist or a paraprofessional). State and federally funded sources (for example, a state funded prekindergarten program or Head Start) were excluded because different curricula and instructional practices are used across sites receiving funding from the same source.
- *Instructional practice.* A specific teaching method that guides the instructional interaction with children. Examples include dialogic reading and phonological awareness training.
- *Lesson package.* A set of lesson plans with a clearly identified name. An intervention that combined two or more named interventions (for example, an intervention that combined Kindergarten Peer Assisted Literacy Strategies and Developing Talkers) was also considered a lesson package.
- *Technology program.* A program that uses a form of technology (such as a computer or audio player) to deliver instruction to students. An intervention was coded as a technology program when the intervention comprised exclusively a single or multiple technology programs.

In the overall rating of effectiveness, the study team included any comparison that permitted the effects of the intervention to be estimated. In some cases this meant that an entire curriculum, lesson package, instructional practice, or technology program was compared with a business-as-usual comparison group (for example, a typical preschool curriculum). In other cases this meant that the additive effects of a particular component of a practice

(for example, adult interaction during shared book reading) was examined in relation to the practice in absence of that additive component (for example, shared book reading). It can also mean that one intervention was compared with another.

**Figure A1. Decision tree for categorizing intervention type**



Source: Authors' compilation.

### **Outcome domains**

The primary outcome domains for this review are language, phonological awareness, print knowledge, decoding, early writing, and general literacy. The structure of the outcome domains in this review are supported by research evaluating the dimensionality of language and literacy constructs with prekindergarten children (Anthony & Lonigan, 2004; Catts et al., 2015; Language and Reading Research Consortium, 2015; Puranik et al., 2011) and are generally consistent with the predictive validity findings in National Early Literacy Panel (2008). Only direct assessments and observations (for example, standardized and researcher-developed assessments) and teacher

ratings of child outcomes were eligible for review under this protocol. Outcomes must also be in English to be eligible for review. Additional information about each domain is described below:

- *Language*. Includes outcomes in the areas described below:<sup>1</sup>
  - *Vocabulary*. The development of knowledge about the meanings, uses, and pronunciation of words. Vocabulary tasks include receptive vocabulary (words understood) and expressive vocabulary (words used).
  - *Listening comprehension*. The ability to understand spoken language or text read aloud.
  - *Syntax*. The ability to display developmentally appropriate knowledge of the rules for combining words into phrases and sentences. Measures of syntactic skill include both receptive tasks (selecting correct responses) and expressive tasks (producing correct responses).
  - *Narrative understanding and production*. The ability to comprehend the basic structure and elements of stories, including the concepts of characters, settings, events, sequences, problems, and outcomes. It also refers to children’s inclusion of these elements in their own oral narratives. Narrative understanding can be demonstrated in a variety of tasks, including narrative production, retell, acting out of stories, and specific responses to queries.
  - *Composite language*. An outcome that encompasses more than one of the other language constructs.
  - *Not otherwise specified*. An outcome that assesses a student’s ability to comprehend or use spoken language but cannot be classified as any of the above constructs.
- *Phonological awareness*. Encompasses phonological and phonemic awareness. Phonological awareness refers to awareness of larger spoken units such as syllables and rhyming words. Tasks of phonological awareness might require students to generate words that rhyme, to segment sentences into words, to segment polysyllabic words into syllables, or to delete syllables from words (for example, what is “candy” without “dy”?). Phonemic awareness refers to the understanding that the sounds of spoken language—phonemes—work together to make words and that phonemes can be substituted and rearranged to create different words. Tasks of phonemic awareness include the ability to identify, think about, and blend the separate sounds of a word (for example, “/c/ /a/ /t/ – cat”).
- *Print knowledge*. Includes outcomes in the areas described below:
  - *Letter knowledge*. Knowledge of the names and sounds of the letters of the alphabet.
  - *Concepts about print*. Knowledge of print, such as print carries a message; print has conventions, such as directionality (left to right, top to bottom), differences between letters and words, distinctions between uppercase and lowercase, and punctuation; and books have some common characteristics (for example, author, title, front and back).
- *Decoding*. Knowledge that there is a predictable relationship between phonemes (the sounds in spoken language) and graphemes (the letters used to represent the sounds in written language) and that such relations can be used to decode or read words.

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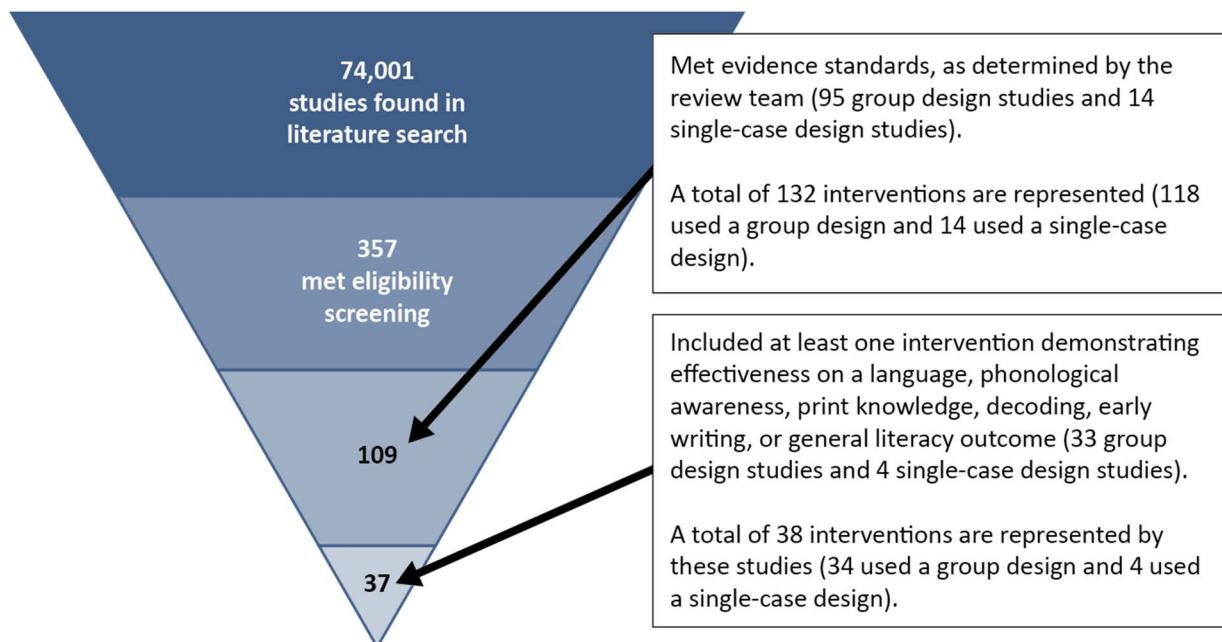
<sup>1</sup> Measures from language sample analyses were included and categorized under the most appropriate language construct.

- *Early writing*. Includes outcomes in the areas described below:
  - *Letter writing*. The ability to write letters.
  - *Name writing*. The ability to write one's own name.
  - *Spelling*. The ability to use phoneme-grapheme relations or orthographic rules to write words.
  - *Written expression*. The understanding that writing conveys meaning. These tasks could include attempts to communicate information through scribbles, symbols, marks, letters, words, or sentences or demonstration of the understanding that writing conveys meaning.
- *General literacy domain*. Includes outcomes that combine measures in two or more of the previous domains (language, phonological awareness, print knowledge, decoding, and early writing) or two or more constructs across domains or that provide some other type of summary score across domains or constructs, such as a “total reading score” on a standardized reading test or a kindergarten readiness score.

### ***Reviewing studies using What Works Clearinghouse evidence standards***

Of the 74,001 unique studies identified by the search procedures, 357 met the eligibility criteria and were reviewed using the *WWC Procedures and Standards Handbook* (version 4.0) for group design and single-case design studies (What Works Clearinghouse, 2017a, 2017b). All reviewers were certified in the WWC standards, version 4.0. Because the online study review guide for entering version 4.0 reviews into the WWC database as required by the Institute of Education Sciences (IES) for its contractors starting in late 2017 was not ready at the time of these reviews, the study team could not use an official WWC protocol for the reviews. Consequently, the reviews, while conducted using the latest WWC standards available at the time, were not entered into the database of official WWC reviews maintained by IES. Therefore, the studies discussed in this report cannot be described as meeting WWC evidence standards with or without reservations or as not meeting WWC evidence standards. After the first reviewer determined the rating of a study, the study was independently reviewed and rated by a second reviewer. A senior reviewer then double-checked the first and second reviews to ensure accuracy and reconcile any differences between the two. Of the 357 studies that were reviewed, 109 were rated as high-quality impact studies (figure A2). The summary of interventions described in this report includes only interventions that two reviewers determined met evidence standards for high-quality impact studies.

**Figure A2. The study team identified 109 studies, representing 132 interventions, that were rated as high-quality impact studies; 37 of those studies, representing 38 interventions, demonstrated effectiveness on at least one language or literacy outcome domain**



Source: Authors' compilation.

Of the 357 studies reviewed, 248 were rated by the study team as not meeting the evidence standards. Of those 248, 44 percent were unable to establish baseline equivalence for the analytic sample between the intervention and comparison groups (table A1). Baseline equivalence must be demonstrated for randomized controlled design studies with high attrition and for quasi-experimental design studies. Within each outcome domain, if any baseline measure is considered nonequivalent, the entire domain is rated as lacking baseline equivalence. Studies with multiple outcome domains receive a rating for each domain based on the establishment of baseline equivalence. If a study does not demonstrate baseline equivalence across all domains, the study is rated as not meeting the standards. About 38 percent of the studies rated as not meeting the evidence standards included a confound, which means that the study findings cannot be attributed solely to the intervention. A confound can occur when only one unit is assigned to one or all conditions or when the intervention was always used in combination with another intervention. About 5 percent of the studies rated as not meeting the evidence standards did not meet validity and reliability requirements, included outcome measures that were not collected in the same manner for all participating children, or included outcome measures that were considered overaligned.

**Table A1. Reasons studies were rated as not meeting the evidence standards, as determined by the study team**

Reason	Number of studies	Share of total (percent)
Baseline equivalence of the intervention and comparison groups used for the analysis was not demonstrated. <sup>a</sup>	108	44
The measure of effectiveness could not be attributed solely to the intervention. There was only one unit assigned to one or both conditions (confound).	94	38
The eligible outcomes did not meet requirements for validity and reliability. <sup>b</sup>	5	2
The outcomes were not collected in the same way for all participating children.	4	2
Overaligned outcome.	2	1
Did not use acceptable approach to address all missing data in the analytic sample.	4	2
No credible analysis of effect was included.	2	1
Single-case design study with insufficient data points.	22	9
Single-case design study with conditions for manipulation of the independent variable that were not determined by the researcher.	5	2
Single-case design study with outcome that did not meet requirements.	2	1
<b>Total</b>	<b>248</b>	<b>100</b>

Note: Percentages do not sum to 100 because of rounding.

a. According to What Works Clearinghouse (WWC) standards for group design, baseline equivalence should be demonstrated for quasi-experimental design studies or high-attrition randomized controlled trials with some missing or imputed baseline data in the analytic sample. A study is rated as not meeting WWC group design standards if baseline equivalence was not demonstrated in an outcome domain or if the analysis did not include an acceptable statistical adjustment to meet the requirement.

b. According to WWC standards for group design, outcome measures must demonstrate sufficient face validity and reliability. To demonstrate face validity, a measure had to be defined and had to assess what it was described as assessing. Reliability for group-design studies was assessed using the following standards determined by the WWC: internal consistency (at least of .50), temporal stability or test-retest reliability (at least of .40), or interrater reliability (at least of .50).

Source: Authors' compilation.

### **Coding the description of the intervention in the 109 studies that met the evidence standards**

The 109 studies that the study team determined met the evidence standards and their 132 included interventions were coded by the study team according to a common set of codes. A code book was created to capture the implementation characteristics and instructional features specific to each instructional domain. Study team members were trained to reliably use the codebook.

#### *Implementation characteristics*

- What is the type of intervention? See the “Intervention types” section for the definition of each intervention type (curriculum, lesson package, instructional practice, and technology program).
- What is the grouping/group size in which students experience instruction? One or more of the following were selected: whole class (6 or more students and 80 percent or more of the class), large group (6 or more students and less than 80 percent of the class), small group (2–6 students), or one on one.
- What is the total duration of the intervention? Coders noted the number of minutes each session lasted, the number of sessions that occurred each week, and the number of weeks the intervention lasted. This information was used to categorize the intervention into one of four categories: less than 2 hours, 2–25 hours, 26–50 hours, or more than 60 hours.
- Who implemented the instruction with children? One or more of the following options were selected: researcher (including researcher assistant or hired staff), teacher (including classroom teacher, special

education teacher, or teacher assistant), technology (with or without adult supervision), or other (including speech-language pathologists, paraprofessionals, volunteers, or parents).

- Are written lesson plans provided for interventionists?
- Is professional development provided for interventionists prior to implementing the intervention? If yes, what is the duration?
- Is ongoing support provided for interventionists during implementation of the intervention?

#### *Instructional features*

- Language
  - Is connected text (for example, a book) present? Connected text refers to multiple sentences that are related to each other. What type of book was used (ABC or narrative)?
  - Does the intervention include children listening to read aloud text? Does the implementer ask students questions pertaining to the connected text before, during, or after shared book reading?
  - Which instructional components and techniques are included?
    - *Narrative text structure.* Intervention focuses on story grammar or narrative text structures such as character, setting, problem, resolution, or sequence of events.
    - *Expository text structure.* Intervention focuses on expository text structures such as cause and effect, information in sequence, or ordinal keywords.
    - *Comprehension, inference, and elaboration.* Text is not required for comprehension interventions. Interventions focusing on comprehension might include such instructional components as identifying the main idea, connecting story to life, drawing inference from literal or nonliteral questions, or passive listening. Instructional techniques might include modeling, asking questions by adults or children, making a prediction, recalling or retelling a story, acting-out a story, making an oral or written extension, or reading text to children.
    - *Vocabulary.* Intervention focuses on promoting vocabulary by labeling, identifying, or pronouncing vocabulary by adults or children. Other instructional activities might include providing a definition, written exposure, systematic repeated exposure, oral text reading, or elaboration (for example, synonym/antonym generation, category sorting, connecting to life, describing attributes, verb demonstration, or providing example/nonexample).
    - *Morphology/morphosyntax.* Intervention focuses on word parts and their roles and functions (for example, “un” at the beginning of a word usually means “not”; adding “s” at the end of a word typically means plural). Instructional technique might include modeling, asking question by adults or children, making an extension, recasting, using gestures, retelling a story, or playing interactive games.
    - *Phrasal/sentence syntax.* Intervention focuses on the formation of sentences and the associated grammatical rules. Instructional technique might include modeling, asking question by adults or children, making an extension, recasting, using gestures, retelling a story, or playing interactive games.
    - *WH- questions.* Intervention involves responding and generating WH- questions (for example, who, what, where, and when). Instructional technique might include modeling, question generation by adults or children, using gestures, retelling a story, or playing interactive games.

- *Extending/elaborating expressive language.* Intervention focuses on supporting children's expressive language complexity. Instructional technique might include modeling, making an extension, recasting, cloze elicitation, asking open-ended questions, or playing interactive games.
  - *Speech-production (phonology-related).* Intervention focuses on eliciting speech-production to fulfill a phonology-related instructional goal.
  - *Pragmatics.* Intervention focuses on communicative rules such as turn taking.
- Phonological awareness
  - Is connected text (for example, a book) present? What type of book was used? (ABC or narrative)
  - What instructional tasks and sound units are taught? The instructional tasks might include blending, deleting, substituting, identifying, matching or sorting, segmenting, or counting sound units. Other instructional tasks include producing or reciting words that share the same sound unit. Sound units might include first phoneme or onset, final consonant, vowel, body-coda, rime unit, syllable, or word.
  - What is the sequence of intervention? The sequence could be specified by task or unit.
- Print knowledge
  - Is connected text (for example, a book) present? What type of book was used (ABC or narrative)?
  - What letter knowledge skills are taught? The intervention might focus on letter sounds, letter names, or orthographic shape.
  - What is the quantity of letter sounds or letter names taught? The quantity of letter sounds or names could be either the whole alphabet or a subset of the alphabet.
  - What is the sequence of letter names and sounds in the intervention if both are taught? The sequence of skills could be letter name first, letter sound first, or simultaneous.
  - What concepts about print are taught? The instructional activities might focus on the definition of author or illustrator, book conventions (for example, front cover, text, or illustration), the directionality of print, the use of punctuation, the one-to-one word-to-speech correspondence, and that print is what is read and conveys meaning.
- Decoding
  - Is connected text (for example, a book) present? What type of book was used? (ABC or narrative)
  - What instructional tasks and unit are taught? The instructional task might include blending into words, segmenting from words, or reading words. The units being manipulated might include single syllable or multisyllable words (or nonwords).
- Early writing
  - Is connected text (for example, a book) present? What type of book was used (ABC or narrative)?
  - What instructional tasks and units are taught?
    - *Individual letter formation.* Intervention focuses on individual letter formation by adults or children. Instructional activities might combine adult- or child-generated and adult- or child-encoded letters. Techniques used during the instruction might include copying or tracing.
    - *Whole word encoding.* Intervention focuses on whole word writing in isolation by adults or children. Instructional activities might combine adult- or child-generated and adult- or child-encoded words.

Techniques used during the instruction might include copying, tracing, spelling, or letter by letter dictation by adults.

- *Connected text.* Intervention focuses on sentence, phrase, or paragraph writing by adults or children. Instruction tasks might combine adult- or child-generated and adult- or child-encoded text. Techniques used during the instruction might include copying, tracing, spelling, or word by word dictation by adults.

### ***Calculations of weighted effect sizes and confidence intervals***

This section provides detailed information on how weights were applied to effect sizes based on sample sizes and on the adjustments made to fixed-effects models to create random-effects models.

*Weighting effect sizes.* Prior to combining effect sizes across multiple samples, a weight was calculated for each effect size (equation A1). The assumption is that effect sizes based on larger sample sizes will produce effect sizes more similar to the “true” effect in the population than smaller sample sizes will. Therefore, effect sizes based on larger sample sizes are given more weight when calculating the average effect size than effect sizes based on smaller sample sizes (Cooper et al., 2009).

$$w_i = \frac{2(n_{iT} + n_{iC})n_{iT}n_{iC}}{2(n_{iT} + n_{iC})^2 + n_{iT}n_{iC}g_i^2} \quad (\text{A1})$$

where  $w_i$  is the weight for each effect size,  $n_{iT}$  is the sample size for the treatment (or intervention) condition,  $n_{iC}$  is the sample size for the comparison condition, and  $g_i$  is the effect size estimate. The weight represents the inverse of the standard error of the estimate.

The weighted effect size is then calculated as the sum of the products of the effect sizes and their weights, divided by the sum of the weights (equation A2).

$$\bar{g}_w = \frac{\sum_{i=1}^k g_i w_i}{\sum_{i=1}^k w_i} \quad (\text{A2})$$

where  $\bar{g}_w$  is the weighted effect size,  $g_i$  is the effect size for the  $i$ th comparison,  $w_i$  is the corresponding weight (equation A1), and  $k$  is the total number of effect sizes being combined.

The 95 percent confidence interval represents the range of effect size values within which the “true” effect is likely to exist with 95 percent certainty (equation A3). If the calculated range of effect size values includes 0, the average weighted effect size is indistinguishable from 0.

$$CI_{g,95\%} = \bar{g}_w \pm 1.96 \sqrt{\frac{1}{\sum_{i=1}^k w_i}} \quad (\text{A3})$$

where  $CI_{g,95\%}$  is the 95 percent confidence interval,  $\bar{g}_w$  is the weighted effect size, and  $\sum_{i=1}^k w_i$  is the sum of the weights for the effect sizes being combined.

The confidence intervals in a random-effects model are calculated differently to account for additional possible sources of error. In a random-effects model an alternative calculation is used to estimate effect size weights (equation A4). All confidence intervals reported are based on random-effects models.

$$w_i = \frac{1}{se_i^2 + \hat{\sigma}_\theta^2} \quad (\text{A4})$$

where  $w_i$  is the random-effects weight for each effect size,  $se_i$  is the standard error of the estimate, and  $\hat{\sigma}_\theta$  is the additional error component (see equation A5).

*Adjustments for random effects.* In this review, results are reported for the random-effects model. This analytical model assumes that the “true” effect might vary from study to study. For example, the effect size might be a little

larger if the students are younger, if the students are at greater risk for reading difficulties, or if the study used a more intensive or comprehensive intervention. The curricula, lesson plans, and instructional practices included in this report represent a wide range of early literacy interventions. Although this review examined one implementation characteristic or instructional feature at a time in its estimation of effects, there might still be variability in interventions that share the same characteristics or features. Given the wide range of interventions and implementation characteristics, the study team adopted the random-effects model for the analyses (Cooper et al., 2009).

To account for random effects, an extra component,  $\hat{v}_\theta$ , is added to the standard error associated with an effect size estimate. The inverse of the standard error estimate becomes the new weight for the effect. The formula for  $\hat{v}_\theta$  as reported in Lipsey and Wilson (2001) is:

$$\hat{v}_\theta = \frac{Q-k-1}{\sum w - \left( \frac{\sum w^2}{\sum w} \right)} \quad (\text{A5})$$

where  $Q$  is the Hedges'  $Q$  statistic,  $k$  is the number of effects, and  $w$  is the weights.

The Hedges'  $Q$  statistic tests for homogeneity of effects and represents a test of the assumption that all effect sizes are estimating the same population value. The Hedges'  $Q$  statistic follows a  $\chi^2$  distribution with  $k - 1$  degrees of freedom when effect sizes are estimating the same population value. A statistically significant  $Q$  statistic (that is, one that exceeds the critical value for  $\chi^2$  with the appropriate degrees of freedom) suggests that factors associated with the particular samples might be affecting the effect sizes. Therefore, a significant  $Q$  statistic provides justification to explore whether particular features of samples or research conditions might be related to magnitudes of effect sizes (Cooper et al., 2009).

The method used to calculate Hedges'  $Q$  statistic for this report is:

$$Q = \sum w_i (g - \bar{g}_w)^2 \quad (\text{A6})$$

where  $w_i$  is the fixed-effect weight associated with the  $i$ th effect size,  $g$  is the corresponding effect size, and  $\bar{g}_w$  is the fixed-effect weighted effect size estimate.

In practice, adding the additional error to the standard error has two effects. First, it reduces the impact of the sample size weights on the weighted effect size. Second, it increases the confidence interval around the weighted effect size, thereby making it less likely to find a significant effect.

## References

Al Otaiba, S., & Fuchs, D. (2002). Characteristics of children who are unresponsive to early literacy intervention: A review of the literature. *Remedial and Special Education*, 23(5), 300–316. <https://eric.ed.gov/?id=EJ655440>.

Al Otaiba, S., Puranik, C. S., Ziolkowski, R. A., & Montgomery, T. M. (2009). Effectiveness of early phonological awareness interventions for students with speech or language impairments. *The Journal of Special Education*, 43(2), 107–128. <https://eric.ed.gov/?id=EJ847502>.

Allen, A. C. (2016). *A meta-analysis on the variables of storybook reading relative to early literacy development* (UMI No. 10181450) [Master's thesis, University of California Riverside]. ProQuest Dissertations & Theses database.

Anderson, L. M., Shinn, C., Fullilove, M. T., Scrimshaw, S. C., Fielding, J. E., Normand, J., et al. (2003). The effectiveness of early childhood development programs: A systematic review. *American Journal of Preventive Medicine*, 24(3), 32–46. [http://doi.org/10.1016/S0749-3797\(02\)00655-4](http://doi.org/10.1016/S0749-3797(02)00655-4).

Anthony, J. L., & Lonigan, C. J. (2004). The nature of phonological awareness: Converging evidence from four studies of preschool and early grade school children. *Journal of Educational Psychology*, 96(1), 43–55. <https://eric.ed.gov/?id=EJ684924>.

Blok, H. (1999). Reading to young children in educational settings: A meta-analysis of recent research. *Language Learning*, 49(2), 343–371. <http://doi.org/10.1111/0023-8333.00091>.

Blok, H., Fukkink, R., Gebhardt, E., & Leseman, P. (2005). The relevance of delivery mode and other programme characteristics for the effectiveness of early childhood intervention. *International Journal of Behavioral Development*, 29(1), 35–47. <https://eric.ed.gov/?id=EJ816095>.

Bowers, P. N., Kirby, J. R., & Deacon, S. H. (2010). The effects of morphological instruction on literacy skills: A systematic review of the literature. *Review of educational research*, 80(2), 144–179. <https://eric.ed.gov/?id=EJ889128>.

Breit-Smith, A., Justice, L. M., McGinty, A. S., & Kaderavek, J. (2009). How often and how much? Intensity of print referencing intervention. *Topics in Language Disorders*, 29(4), 360–369. <https://eric.ed.gov/?id=EJ885272>.

Burger, K. (2015). Effective early childhood care and education: Successful approaches and didactic strategies for fostering child development. *European Early Childhood Education Research Journal*, 23(5), 743–760. <https://eric.ed.gov/?id=EJ1082920>.

Burger, K., & Winner, E. (2000). Instruction in visual art: Can it help children learn to read? *Journal of Aesthetic Education*, 34(3/4), 277–293. <https://eric.ed.gov/?id=EJ658285>.

Burne, B., Knaufelc, V., Melonis, M., & Heyn, P. C. (2011). The use and application of assistive technology to promote literacy in early childhood: A systematic review. *Disability and Rehabilitation: Assistive Technology*, 6(3), 207–213. <http://doi.org/10.3109/17483107.2010.522684>.

Bus, A. G., & Van IJzendoorn, M. H. (1999). Phonological awareness and early reading: A meta-analysis of experimental training studies. *Journal of Educational Psychology*, 91(3), 403. <http://doi.org/10.1037/0022-0663.91.3.403>.

Camilli, G., Vargas, S., Ryan, S., & Barnett, W. S. (2010). Meta-analysis of the effects of early education interventions on cognitive and social development. *Teachers College Record*, 112(3), 579–620. <https://eric.ed.gov/?id=EJ888457>.

Catts, H. W., Herrera, S., Nielsen, D. C., & Bridges, M. S. (2015). Early prediction of reading comprehension within the simple view framework. *Reading and Writing*, 28(9), 1407–1425. <https://eric.ed.gov/?id=EJ1074936>.

Chambers, B., Cheung, A. C., & Slavin, R. E. (2016). Literacy and language outcomes of comprehensive and developmental-constructivist approaches to early childhood education: A systematic review. *Educational Research Review*, 18(1), 88–111. <https://eric.ed.gov/?id=ED573668>.

Chambers, B., Cheung, A., Slavin, R. E., Smith, D., & Laurenzano, M. (2010). Effective early childhood education programs: A systematic review. *Center for Research and Reform in Education*, 1-60. <https://eric.ed.gov/?id=ED527643>.

Chambers, B., Cheung, A. C. K., & Slavin, R. E. (2006). Effective preschool programs for children at risk of school failure: A best-evidence synthesis. In B. Spodek & O. N. Saracho (Eds.), *Handbook of research on the education of young children* (2nd ed.) (pp. 347–359). Lawrence Erlbaum Associates.

Christ, T., & Wang, X. C. (2011). Closing the vocabulary gap? A review of research on early childhood vocabulary practices. *Reading Psychology*, 32(5), 426–458. <https://eric.ed.gov/?id=EJ946766>.

Connor, C. M., Alberto, P. A., Compton, D. L., & O'Connor, R. E. (2014). *Improving reading outcomes for students with or at risk for reading disabilities: A synthesis of the contributions from the Institute of Education Sciences Research Centers* (NCSER No. 2014-3000). National Center for Special Education Research (NCSER). <https://eric.ed.gov/?id=ED544759>.

Cooper, H., Hedges, L. V., & Valentine, J. C. (Eds.). (2009). *The handbook of research synthesis and meta-analysis* (2<sup>nd</sup> ed.). Russell Sage Foundation.

Darrow, C. L. (2009). *Language and literacy effects of curriculum interventions for preschools serving economically disadvantaged children: A meta analysis*. Society for Research on Educational Effectiveness. <https://eric.ed.gov/?id=ED514949>.

Darrow, C. L. (2010). *Making sense of preschool research: A multi-paper dissertation on the implementation and effectiveness of preschool curriculum interventions* (UMI No. 769908272) [Doctoral dissertation, Vanderbilt University]. ProQuest Dissertations & Theses database.

Diamond, K. E., Justice, L. M., Siegler, R. S., & Snyder, P. A. (2013). *Synthesis of IES research on early intervention and early childhood education* (NCSER No. 2013-3001). National Center for Special Education Research (NCSER). <https://eric.ed.gov/?id=ED544212>.

Ehri, L. C., Nunes, S. R., Willows, D. M., Schuster, B. V., Yaghoub-Zadeh, Z., & Shanahan, T. (2001). Phonemic awareness instruction helps children learn to read: Evidence from the National Reading Panel's meta-analysis. *Reading Research Quarterly, 36*(3), 250–287. <https://eric.ed.gov/?id=EJ629253>.

Elleman, A. M., Lindo, E. J., Morphy, P., & Compton, D. L. (2009). The impact of vocabulary instruction on passage-level comprehension of school-age children: A meta-analysis. *Journal of Research on Educational Effectiveness, 2*(1), 1–44. <https://eric.ed.gov/?id=EJ866970>.

Filiatrault-Veilleux, P., Bouchard, C., Trudeau, N., & Desmarais, C. (2015). Inferential comprehension of 3–6 year olds within the context of story grammar: A scoping review. *International Journal of Language & Communication Disorders, 50*(6), 737–749. <http://doi.org/10.1111/1460-6984.12175>.

Fukkink, R. G., & Lont, A. (2007). Does training matter? A meta-analysis and review of caregiver training studies. *Early Childhood Research Quarterly, 22*(3), 294–311. <https://eric.ed.gov/?id=EJ782961>.

Graham, S., Liu, X., Aitken, A., Ng, C., Bartlett, B., Harris, K. R., et al. (2018). Effectiveness of literacy programs balancing reading and writing instruction: A meta-analysis. *Reading Research Quarterly, 53*(3), 279–304. <https://eric.ed.gov/?id=EJ1183265>.

Guo, Y., Wang, S., Hall, A. H., Breit-Smith, A., & Busch, J. (2016). The effects of science instruction on young children's vocabulary learning: A research synthesis. *Early Childhood Education Journal, 44*(4), 359–367. <https://eric.ed.gov/?id=EJ1102230>.

Hosley, C. A. (2000). *Early childhood education programs: A review of program models and effectiveness*. Wilder Research Center. <https://eric.ed.gov/?id=ED440754>.

Hsin, C. T., Li, M. C., & Tsai, C. C. (2014). The influence of young children's use of technology on their learning: A review. *Journal of Educational Technology & Society, 17*(4), 85–99. <https://eric.ed.gov/?id=EJ1045554>.

Jalongo, M. R., & Sobolak, M. J. (2011). Supporting young children's vocabulary growth: The challenges, the benefits, and evidence-based strategies. *Early Childhood Education Journal, 38*(6), 421–429. <https://eric.ed.gov/?id=EJ915821>.

Kelchen, R., Magnuson, K., Duncan, G., Schindler, H., Shager, H., & Yoshikawa, H. (2011). *Do the effects of early childhood programs on academic outcomes vary by gender? A meta-analysis*. Society for Research on Educational Effectiveness. <https://eric.ed.gov/?id=ED517846>.

Kunkel, A. K. (2015). The effects of computer-assisted instruction in reading: A meta-analysis (UMI No. 1724669047) [Doctoral dissertation, University of Minnesota]. ProQuest Dissertations & Theses Database.

Language and Reading Research Consortium. (2015). The dimensionality of language ability in young children. *Child Development, 86*(6), 1948–1965. <https://eric.ed.gov/?id=EJ1079898>.

Lankshear, C., & Knobel, M. (2003). New technologies in early childhood literacy research: A review of research. *Journal of Early Childhood Literacy, 3*(1), 59–82. <http://doi.org/10.1177/14687984030031003>.

Lee, B. K., Patall, E. A., Cawthon, S. W., & Steingut, R. R. (2015). The effect of drama-based pedagogy on preK–16 outcomes: A meta-analysis of research from 1985 to 2012. *Review of Educational Research, 85*(1), 3–49. <https://eric.ed.gov/?id=EJ1052099>.

Lin, J. (2013). The effects of code-based literacy interventions on spelling achievement: A meta-analysis (UMI No. 1430900249) [Doctoral dissertation, The City University of New York]. ProQuest Dissertations & Theses Database.

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. Sage.

Ma, W., Adesope, O. O., Nesbit, J. C., & Liu, Q. (2014). Intelligent tutoring systems and learning outcomes: A meta-analysis. *Journal of Educational Psychology, 106*(4), 901. <https://eric.ed.gov/?id=EJ1049508>.

Magnuson, K. A., Kelchen, R., Duncan, G. J., Schindler, H. S., Shager, H., & Yoshikawa, H. (2016). Do the effects of early childhood education programs differ by gender? A meta-analysis. *Early Childhood Research Quarterly*, 36(1), 521–536. <http://dx.doi.org/10.1016/j.ecresq.2015.12.021>.

Markussen-Brown, J., Juhl, C. B., Piasta, S. B., Bleses, D., Højen, A., & Justice, L. M. (2017). The effects of language-and literacy-focused professional development on early educators and children: A best-evidence meta-analysis. *Early Childhood Research Quarterly*, 38(1), 97–115. <http://dx.doi.org/10.1016/j.ecresq.2016.07.002>.

Marulis, L. M., & Neuman, S. B. (2010). The effects of vocabulary intervention on young children's word learning: A meta-analysis. *Review of Educational Research*, 80(3), 300–335. <https://eric.ed.gov/?id=EJ906930>.

McCoy, D. C., Yoshikawa, H., Ziol-Guest, K. M., Duncan, G. J., Schindler, H. S., Magnuson, K., et al. (2017). Impacts of early childhood education on medium-and long-term educational outcomes. *Educational Researcher*, 46(8), 474–487. <https://eric.ed.gov/?id=EJ1161123>.

Mol, S. E., Bus, A. G., & de Jong, M. T. (2009). Interactive book reading in early education: A tool to stimulate print knowledge as well as oral language. *Review of Educational Research*, 79(2), 979–1007. <https://eric.ed.gov/?id=EJ879465>.

Moses, A. M. (2008). Impacts of television viewing on young children's literacy development in the USA: A review of the literature. *Journal of Early Childhood Literacy*, 8(1), 67–102. <https://eric.ed.gov/?id=EJ789997>.

National Early Literacy Panel. (2008). *Developing early literacy: Report of the National Early Literacy Panel*. National Institute for Literacy. <https://eric.ed.gov/?id=ED504224>.

Neale, D., & Pino-Pasternak, D. (2017). A review of reminiscing in early childhood settings and links to sustained shared thinking. *Educational Psychology Review*, 29(3), 641–665. <https://eric.ed.gov/?id=EJ1150787>.

Nelson, J. R., Benner, G. J., & Gonzalez, J. (2003). Learner characteristics that influence the treatment effectiveness of early literacy interventions: A meta-analytic review. *Learning Disabilities Research & Practice*, 18(4), 255–267. <https://eric.ed.gov/?id=EJ677952>.

Odom, S. L., & Strain, P. S. (2002). Evidence-based practice in early intervention/early childhood special education: Single-subject design research. *Journal of Early Intervention*, 25(2), 151–160. <https://eric.ed.gov/?id=EJ666134>.

Petersen, D. B. (2011). A systematic review of narrative-based language intervention with children who have language impairment. *Communication Disorders Quarterly*, 32(4), 207–220. <https://eric.ed.gov/?id=EJ931488>.

Piasta, S. B., & Wagner, R. K. (2010). Developing early literacy skills: A meta-analysis of alphabet learning and instruction. *Reading Research Quarterly*, 45(1), 8–38. <https://eric.ed.gov/?id=EJ871738>.

Pidano, A. E., & Allen, A. R. (2015). The Incredible Years series: A review of the independent research base. *Journal of Child and Family Studies*, 24(7), 1898–1916. <http://dx.doi.org/10.1007/s10826-014-9991-7>.

Puranik, C. S., Lonigan, C. J., & Kim, Y. S. (2011). Contributions of emergent literacy skills to name writing, letter writing, and spelling in preschool children. *Early Childhood Research Quarterly*, 26(4), 465–474. <https://eric.ed.gov/?id=EJ938476>.

Reynolds, M., Wheldall, K., & Madelaine, A. (2011). What recent reviews tell us about the efficacy of reading interventions for struggling readers in the early years of schooling? *International Journal of Disability, Development and Education*, 58(3), 257–286. <https://eric.ed.gov/?id=EJ949011>.

Schweinhart, L. J. (2001). Recent evidence on preschool programs (ED No. 458046.) ERIC Digest. <https://eric.ed.gov/?id=ED458046>.

Standley, J. M. (2008). Does music instruction help children learn to read? Evidence of a meta-analysis: Update. *Applications of Research in Music Education*, 27(1), 17–32. <https://eric.ed.gov/?id=EJ811673>.

Suggate, S. P. (2016). A meta-analysis of the long-term effects of phonemic awareness, phonics, fluency, and reading comprehension interventions. *Journal of Learning Disabilities*, 49(1), 77–96. <https://eric.ed.gov/?id=EJ1083414>.

Swanson, E., Vaughn, S., Wanzek, J., Petscher, Y., Heckert, J., Cavanaugh, C., et al. (2011). A synthesis of read-aloud interventions on early reading outcomes among preschool through third graders at risk for reading difficulties. *Journal of Learning Disabilities*, 44(3), 258–275. <https://eric.ed.gov/?id=EJ923007>.

Takacs, Z. K., Swart, E. K., & Bus, A. G. (2014). Can the computer replace the adult for storybook reading? A meta-analysis on the effects of multimedia stories as compared to sharing print stories with an adult. *Frontiers in Psychology*, 5, 1366. <http://doi.org/10.3389/fpsyg.2014.01366>.

Towson, J. A., Fettig, A., Fleury, V. P., & Abarca, D. L. (2017). Dialogic reading in early childhood settings: A summary of the evidence base. *Topics in Early Childhood Special Education*, 37(3), 132–146. <https://eric.ed.gov/?id=EJ1157849>.

Walker, D. (2011). Evidence-based practice in early childhood intervention. In C. Groark, S. P. Maude, & L. A. Kaczmarek (Eds.), *Early childhood intervention: Shaping the future for children with special needs and their families* (pp. 147–167). ABC-CLIO.

Wasik, B. A., Hindman, A. H., & Snell, E. K. (2016). Book reading and vocabulary development: A systematic review. *Early Childhood Research Quarterly*, 37(1), 39–57. <http://doi.org/10.1016/j.ecresq.2016.04.003>.

What Works Clearinghouse. (2005). *WWC Evidence Review Protocol for Early Childhood Education Interventions, Version 1.0*. U.S. Department of Education, Institute of Education Sciences. Retrieved January 9, 2017, from <https://ies.ed.gov/ncee/wwc/Document/24>.

What Works Clearinghouse. (2009). *WWC Evidence Review Protocol for Early Childhood Education Interventions, Version 2.0*. U.S. Department of Education, Institute of Education Sciences. Retrieved January 9, 2017, from <https://ies.ed.gov/ncee/wwc/Document/24>.

What Works Clearinghouse. (2010). *WWC Evidence Review Protocol for Early Childhood Education Interventions for Children with Disabilities, Version 2.0*. U.S. Department of Education, Institute of Education Sciences. Retrieved January 9, 2017, from <https://ies.ed.gov/ncee/wwc/Document/30>.

What Works Clearinghouse. (2014). *WWC Evidence Review Protocol for Early Childhood Education Interventions, Version 3.0*. U.S. Department of Education, Institute of Education Sciences. Retrieved January 9, 2017, from <https://ies.ed.gov/ncee/wwc/Document/24>.

What Works Clearinghouse. (2017a). *What Works Clearinghouse procedures handbook version 4.0*. U.S. Department of Education, Institute of Education Sciences.

What Works Clearinghouse. (2017b). *What Works Clearinghouse standards handbook version 4.0*. U.S. Department of Education, Institute of Education Sciences.

Zauche, L. H., Thul, T. A., Mahoney, A. E. D., & Stapel-Wax, J. L. (2016). Influence of language nutrition on children's language and cognitive development: An integrated review. *Early Childhood Research Quarterly*, 36(1), 318–333. <http://doi.org/10.1016/j.ecresq.2016.01.015>.

Zucker, T. A., Moody, A. K., & McKenna, M. C. (2009). The effects of electronic books on pre-kindergarten-to-grade 5 students' literacy and language outcomes: A Research Synthesis. *Journal of Educational Computing Research*, 40(1), 47–87. <https://eric.ed.gov/?id=EJ842944>.

## Appendix B. Technical results

This appendix provides technical results pertaining to the primary research question and the additional subquestions addressed in the body of the report. Specifically, this appendix includes tables that report findings by study design (that is, group design and single-case design), details pertaining to the reported weighted effect size estimates, and figures that depict the distribution of implementation characteristics and instructional features among the 132 interventions that were evaluated by the 109 studies that the study team determined met the evidence standards. Box B1 defines key terms used in this appendix.

### Box B1. Key terms

**Benjamini-Hochberg correction.** A correction used to reduce the possibility of mistakenly concluding that the effects are significantly different from zero (called Type I error in hypothesis testing) because repeated tests of highly correlated measures in the same outcome domain can lead to inflated estimates of the effects.

**Effective outcome.** An outcome domain in a studied intervention that used a group design and demonstrated a statistically significant positive effect after multiple comparisons were adjusted for using the Benjamini-Hochberg correction. This term also refers to an outcome domain in a studied intervention that used a single-case design and demonstrated strong or moderate evidence of a positive effect based on the criteria described in version 4.0 of the What Works Clearinghouse (WWC) standards for single-case designs (What Works Clearinghouse, 2017).

**Group design.** A study design in which outcomes for a group receiving an intervention are compared with outcomes for a comparison group. Examples of group designs include randomized controlled trials and quasi-experimental designs.

**Inconclusive outcome.** An outcome domain in a studied intervention that used a group design and did not demonstrate a statistically significant effect after multiple comparisons were adjusted for using the Benjamini-Hochberg correction. This term also refers to an outcome domain in a studied intervention that used a single-case design and demonstrated no evidence of an effect based on the criteria described in version 4.0 of the WWC standards for single-case designs (What Works Clearinghouse, 2017).

**Not effective outcome domain.** An outcome domain in a studied intervention that used a group design and demonstrated a statistically significant negative effect after multiple comparisons were adjusted for using the Benjamini-Hochberg correction. This term also refers to an outcome domain in a studied intervention that used a single-case design and demonstrated strong or moderate evidence of a negative effect based on the criteria described in version 4.0 of the WWC standards for single-case designs (What Works Clearinghouse, 2017).

**Single-case design.** A study design in which an outcome is measured repeatedly within and across different conditions that are defined by the presence or absence of an intervention. Individuals serve as the unit of intervention and provide their own control for purposes of comparison. Examples of single-case designs include multiple baseline designs and alternating treatment designs.

**Table B1. Number of interventions that taught each domain, by effect type**

Effect type	Domain taught				
	Language	Phonological awareness	Print knowledge	Decoding	Early writing
Effective interventions	30	27	18	3	7
Inconclusive interventions	53 <sup>a</sup>	15 <sup>a</sup>	22 <sup>a</sup>	2 <sup>a</sup>	4 <sup>a</sup>
Not effective interventions	3	1	1	0	1
Interventions without an aligned outcome	26	17	27	6	18

Note: See box B1 for definitions of effect types. See table B2 for intervention categorization by study design (that is, group design and single-case design).

a. An effect size could not be calculated with the information provided for two interventions evaluating effectiveness on phonological awareness and for one intervention evaluating effectiveness on each of the other domains; therefore, the findings were considered inconclusive.

Source: Authors' compilation.

**Table B2. Number of interventions that taught each domain, by effect type and study design**

Effect type	Domain taught				
	Language	Phonological awareness	Print knowledge	Decoding	Early writing
<i>Group design (n = 118)</i>					
Effective interventions	28	25	17	3	7
Inconclusive interventions	47 <sup>a</sup>	12 <sup>a</sup>	22 <sup>a</sup>	1 <sup>a</sup>	4 <sup>a</sup>
Not effective interventions	2	1	1	0	1
Interventions without an aligned outcome	25	17	24	6	18
<i>Single-case design (n = 14)</i>					
Effective interventions	2	2	1	0	0
Inconclusive interventions	6	3	0	1	0
Not effective interventions	1	0	0	0	0
Interventions without an aligned outcome	1	0	3	0	0

Note: See box B1 for definitions of intervention categorizations.

a. An effect size could not be calculated with the information provided for two interventions evaluating effectiveness on phonological awareness and for one intervention evaluating effectiveness on each of the other domains; therefore, the findings were considered inconclusive.

Source: Authors' compilation.

**Table B3. Instructional patterns among the 132 interventions evaluated by high-quality impact studies**

Instructional domain taught	Number	Percent	Outcome domain assessed					
			L	PA	PK	D	W	G
L only	50	38	49	6	5	6	5	6
L, PA, & PK	20	15	15	11	12	7	4	4
L, PA, PK, & W	14	11	6	11	11	5	2	1
L & PK	13	10	7	5	6	1	1	2
PA & PK	6	5	1	6	2	1	0	1
PA only	5	4	0	5	0	0	0	0
Taught all areas	5	4	2	4	3	4	4	1
PA, PK, & W	3	2	0	1	3	1	1	0
L & PA	3	2	1	3	1	0	0	1
L & W	3	2	3	1	0	1	1	1
PA, PK, & D	2	2	0	2	0	0	2	0
PK & W	2	2	0	0	2	0	2	0
L, PA, PK, & D	2	2	1	0	0	1	0	0
L, PK, & W	2	2	1	1	2	1	1	0
PA, D, & W	1	1	0	0	0	0	1	0
L & D	1	1	1	0	0	0	0	0

D is decoding. G is general literacy. L is language. PA is phonological awareness. PK is print knowledge. W is early writing.

Note: See table B4 for instructional patterns by study design (that is, group design and single-case design). Percentages do not sum to 100 because of rounding.

Source: Authors' compilation.

**Table B4. Instructional patterns among the 132 interventions evaluated by high-quality impact studies, by study design**

Instructional domain taught	Number	Percent	Outcome domain assessed					
			L	PA	PK	D	W	G
<i>Group design (n = 118)</i>								
L only	42	36	41	6	5	6	5	6
L, PA, & PK	20	17	15	11	12	7	4	4
L, PA, PK, & W	14	12	6	11	11	5	2	1
L & PK	12	10	6	5	6	1	1	2
Taught all areas	5	4	2	4	3	4	4	1
PA only	4	3	0	4	0	0	0	0
PA & PK	3	3	1	3	1	0	0	1
PA, PK, & W	3	3	0	1	3	1	1	0
L & W	3	3	3	1	0	1	1	1
PA, PK, & D	2	2	0	2	0	0	2	0
PK & W	2	2	0	0	2	0	2	0
L & PA	2	2	1	2	1	0	0	1
L, PA, PK, & D	2	2	1	0	0	1	0	0
L, PK, & W	2	2	1	1	2	1	1	0
PA, D, & W	1	1	0	0	0	0	1	0
L & D	1	1	1	0	0	0	0	0
<i>Single-case design (n = 14)</i>								
L only	8	57	8	0	0	0	0	0
PA & PK	3	21	0	3	1	1	0	0
PA only	1	7	0	1	0	0	0	0
L & PA	1	7	0	1	0	0	0	0
L & PK	1	7	1	0	0	0	0	0

D is decoding. G is general literacy. L is language. PA is phonological awareness. PK is print knowledge. W is early writing.

Note: Percentages do not sum to 100 because of rounding.

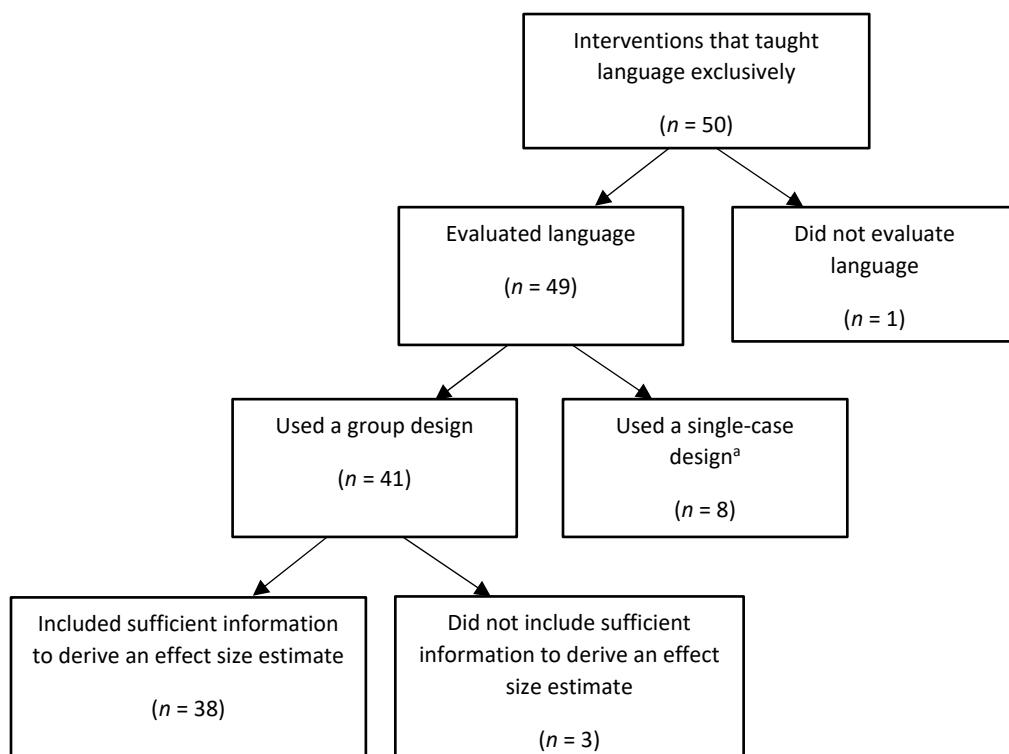
Source: Authors' compilation.

**Table B5. Number and percentage of interventions that evaluated effects in each outcome domain among the 38 interventions that demonstrated effectiveness in at least one outcome domain, by study design**

Outcome domain	Group design ( <i>n</i> = 34)		Single-case design ( <i>n</i> = 4)		All interventions ( <i>n</i> = 38)	
	Number of interventions demonstrating statistically significant positive effects	Percent	Number of interventions demonstrating strong or moderate evidence of effects	Percent	Number of effective interventions	Percent
Language	14	41	2	50	16	42
Phonological awareness	9	26	2	50	11	29
Print knowledge	12	35	1	25	13	34
Decoding	6	18	0	0	6	16
Writing	4	12	0	0	4	11
General literacy	4	12	0	0	4	11

Source: Authors' compilation.

**Figure B1. Flowchart for interventions that taught language exclusively**

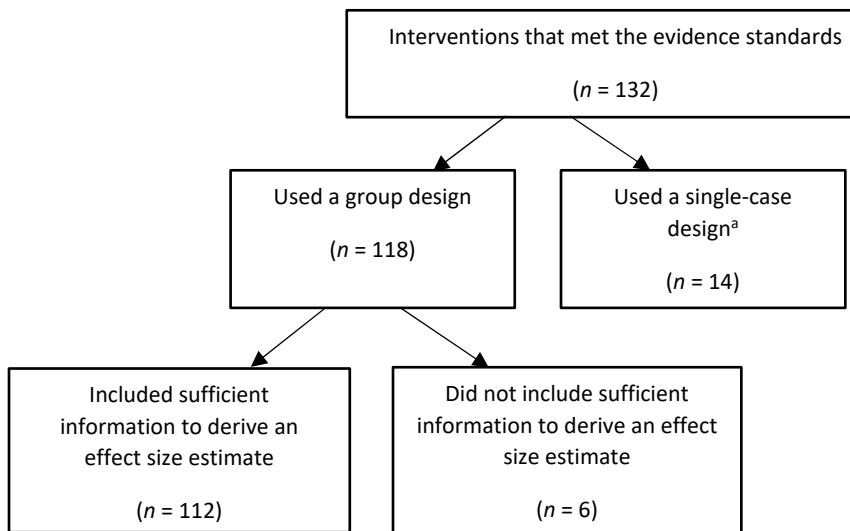


a. In single-case design studies the effect sizes and statistical significance are not estimated; instead, visual analysis is used to evaluate the effectiveness of an intervention. Single-case design studies are therefore not included in weighted effect size estimates.

Source: Authors' compilation.

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**Figure B2. Flowchart for all interventions evaluated by high-quality impact studies**



a. In single-case design studies the effect sizes and statistical significance are not estimated; instead, visual analysis is used to evaluate the effectiveness of an intervention. Single-case design studies are therefore not included in weighted effect size estimates.

Source: Authors' compilation.

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**Table B6. Average weighted effect size on language outcomes among interventions that taught language exclusively, by implementation characteristic**

Implementation characteristic	Number of interventions	Hedges' $g^b$	Standard error	95 percent confidence interval <sup>a</sup>		<i>p</i> -value
				Lower limit	Upper limit	
<b>Intervention type</b>						
Used instructional practices	26	0.43	0.10	0.23	0.63	<.001
Used lesson packages	3	0.17	0.12	-0.07	0.40	.17
Used curricula	6	0.02	0.07	-0.10	0.15	.72
Used technology program	3	0.16	0.14	-0.12	0.44	.26
<b>Intervention duration</b>						
Intervention duration less than 2 hours	12	0.49	0.18	0.15	0.84	<.01
Intervention duration 2–25 hours	19	0.35	0.11	0.15	0.56	<.001
Intervention duration 25–50 hours	0	na	na	na	na	na
Intervention duration more than 60 hours	7	0.06	0.06	-0.05	0.17	.29
<b>Implementer type<sup>c</sup></b>						
Teacher implemented instruction	13	0.11	0.05	0.02	0.21	.02
Researcher implemented instruction	18	0.39	0.12	0.16	0.62	<.001
Other implementer	5	0.20	0.12	-0.04	0.44	.10
<b>Group size</b>						
Used one-on-one or small-group (two to six children) instruction	27	0.43	0.10	0.22	0.63	<.001
Used exclusively large-group <sup>d</sup> or whole-class instruction	11	0.10	0.05	-0.01	0.20	.06
<b>Professional development<sup>e</sup></b>						
Professional development with ongoing support	15	0.20	0.10	0.01	0.39	.04
Professional development without ongoing support	6	0.34	0.12	0.11	0.56	<.001

na is not applicable.

Note: Of the 49 interventions that taught and evaluated effectiveness on language exclusively, 38 were evaluated using a group design and included sufficient information to derive an effect size estimate and are represented in the table. Of the remaining 11, 8 were evaluated using a single-case design in which effect sizes were not estimated, and 3 were evaluated using a group design but did not include sufficient information to derive an effect size estimate.

a. There is a 95 percent probability that the “true” effect size lies between the lower and upper limits. If the interval includes 0, the effect size is not statistically significant.

b. Weighted mean effect size.

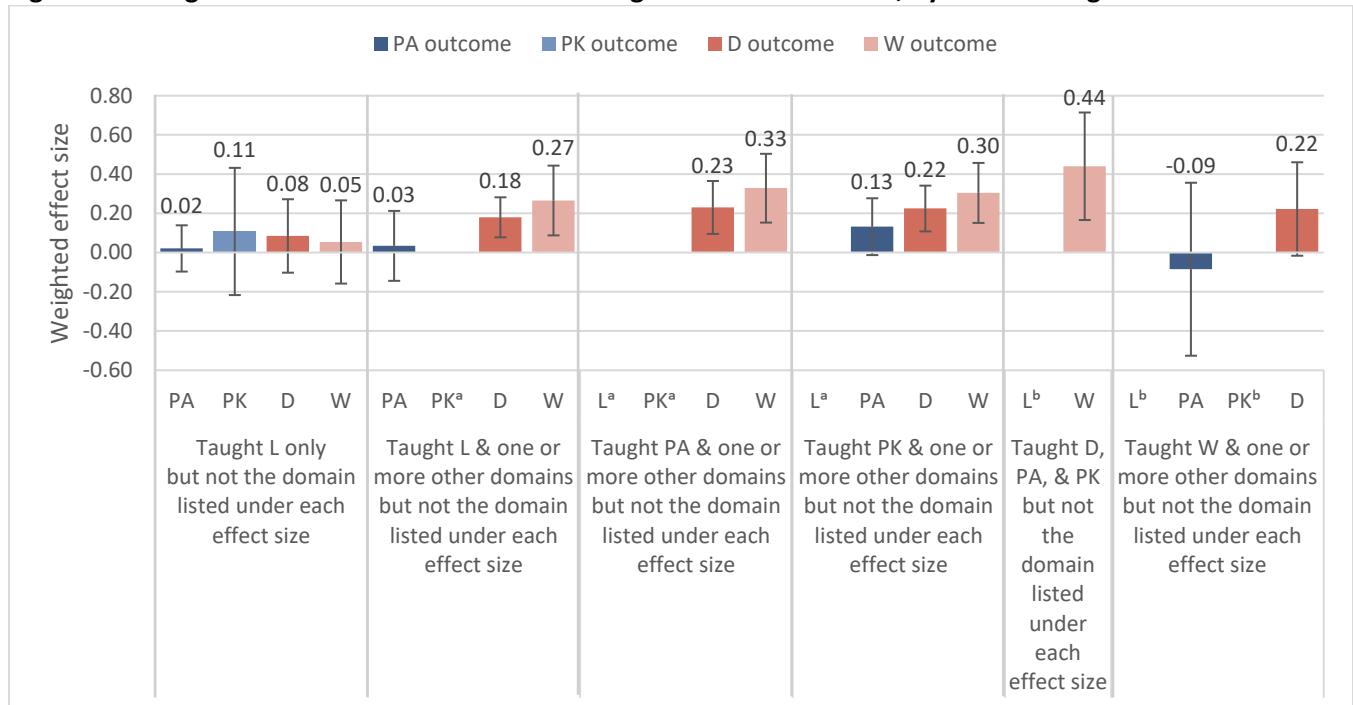
c. Two interventions were implemented by the teacher and the researcher and are not represented in the table.

d. An intervention was coded as using a large group if children were working in groups of more than six and less than 80 percent of the whole class was represented.

e. Two interventions did not provide any professional development, and 15 interventions did not provide sufficient information about professional development.

Source: Authors’ analysis of primary data collected for the review; see appendix E.

**Figure B3. Weighted effect size estimates for untaught outcome domains, by domain taught**



D is decoding. L is language. PA is phonological awareness. PK is print knowledge. W is early writing.

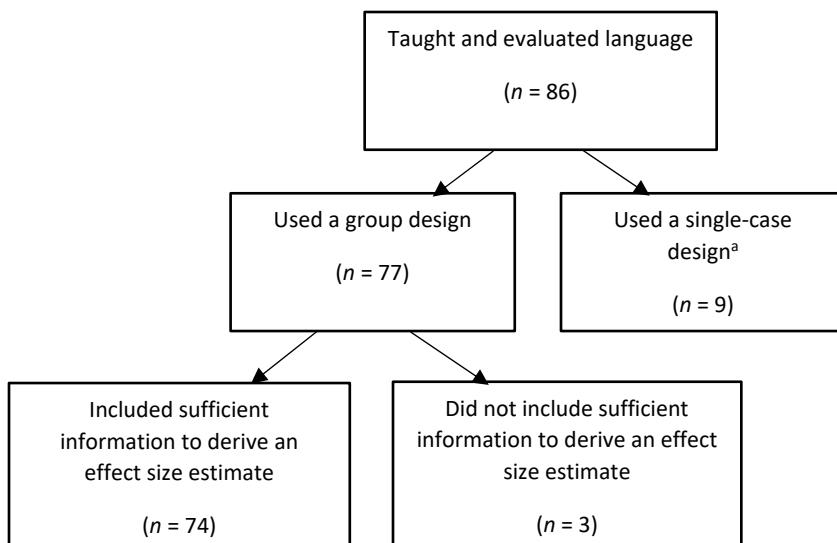
Note: The error bar represents the 95 percent confidence interval, meaning that there is a 95 percent probability that the “true” effect size lies between the lower and upper limits. If the interval includes 0, the weighted mean effect size is not statistically significant. For example, interventions that taught PA and one or more other domains but did not teach decoding resulted in a significant weighted effect size of 0.23 on decoding.

a. A weighted effect size could not be estimated because only one intervention met the referenced criteria.

b. No interventions met the referenced criteria.

Source: Authors’ compilation.

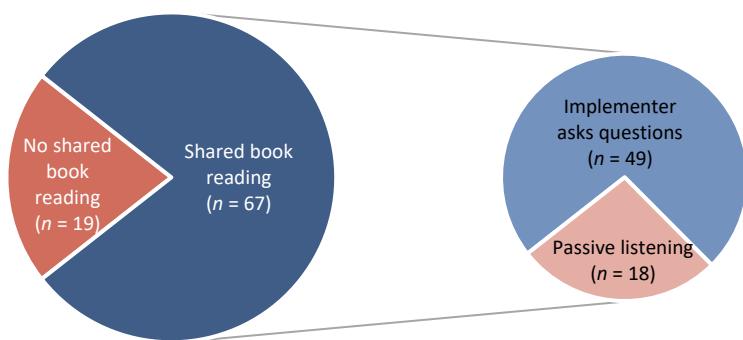
**Figure B4. Flowchart for interventions that taught and evaluated effectiveness on language**



a. In single-case design studies the effect sizes and statistical significance are not estimated; instead, visual analysis is used to evaluate the effectiveness of an intervention. Single-case design studies are therefore not included in weighted effect size estimates.

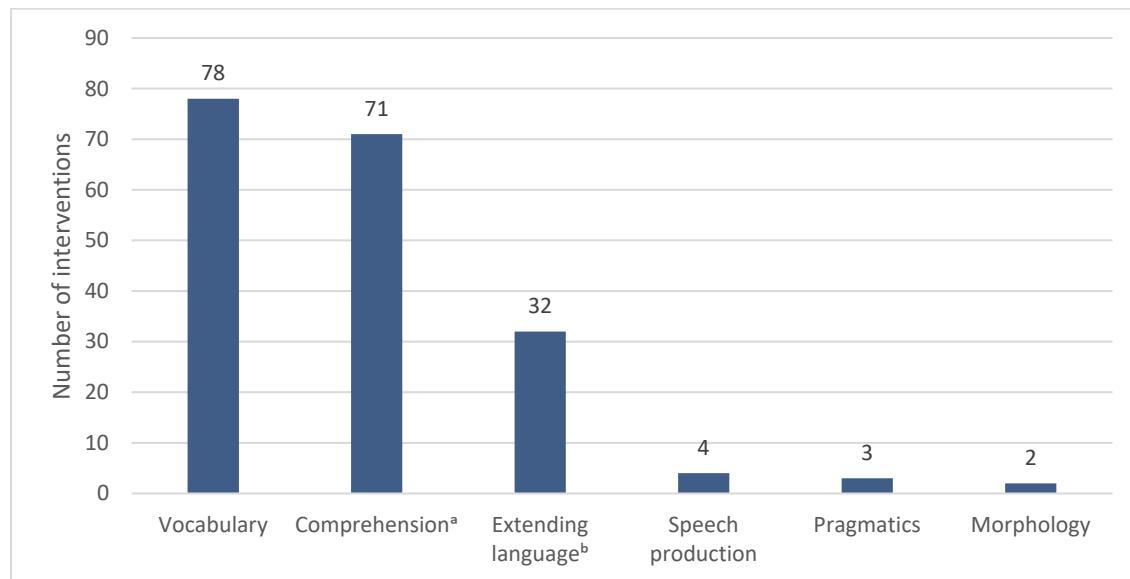
Source: Authors’ compilation.

**Figure B5. Presence of shared book reading with or without questions in the 86 interventions that taught and evaluated effectiveness on language**



Source: Authors' compilation.

**Figure B6. Components of language instruction included in the 86 interventions that taught and evaluated effectiveness on language**



a. Language instruction focused on comprehension always co-occurred with vocabulary instruction.

b. All but three interventions also included vocabulary instruction.

Source: Authors' compilation.

**Table B7. Weighted effect size on language outcomes among interventions that taught and evaluated language, by type of outcome measure**

Type of outcome measure	Number of interventions	Hedges' $g^b$	Standard error	95 percent confidence interval <sup>a</sup>		<i>p</i> -value
				Lower limit	Upper limit	
Overall	74	0.19	0.03	0.12	0.25	<.001
Standardized	53	0.12	0.02	0.07	0.17	<.001
Researcher-developed	31	0.43	0.09	0.25	0.61	<.001

Note: Of the 86 interventions that taught and evaluated effectiveness on language, 74 were evaluated using a group design and included sufficient information to derive an effect size estimate and are represented in the table. Of the remaining 12, 9 were evaluated using a single-case design in which effect sizes were not estimated, and 3 were evaluated using a group design but did not include sufficient information to derive an effect size estimate.

a. There is a 95 percent probability that the “true” effect size lies between the lower and upper limits. If the interval includes 0, the effect size is not statistically significant.

b. Weighted mean effect size.

Source: Authors’ analysis of primary data collected for the review; see appendix E.

**Table B8. Average weighted effect size on language outcomes among interventions that taught and evaluated language, by instructional feature**

Instructional feature	Number of interventions	Hedges' $g^b$	Standard error	95 percent confidence interval <sup>a</sup>		<i>p</i> -value
				Lower limit	Upper limit	
Included any shared book reading	59	0.20	0.04	0.12	0.27	<.001
Did not include any shared book reading	15	0.20	0.06	0.07	0.32	.002
Included shared book reading with questions	42	0.26	0.06	0.15	0.37	<.001
Included shared book reading without questions	17	0.09	0.04	0.01	0.17	.03
Included both comprehension and vocabulary	62	0.20	0.04	0.12	0.27	<.001
Did not include both comprehension and vocabulary	12	0.14	0.08	-0.01	0.30	.08
Included vocabulary and extending language	25	0.26	0.07	0.12	0.40	<.001
Included vocabulary but not extending language	43	0.15	0.04	0.07	0.22	<.001

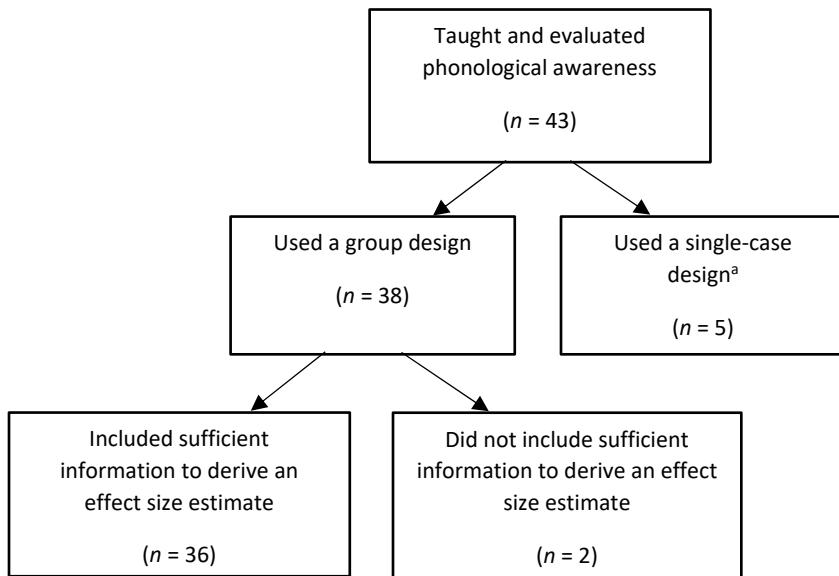
Note: Of the 86 interventions that taught and evaluated effectiveness on language, 74 were evaluated using a group design and included sufficient information to derive an effect size estimate and are represented in the table. Of the remaining 12, 9 were evaluated using a single-case design in which effect sizes were not estimated, and 3 were evaluated using a group design but did not include sufficient information to derive an effect size estimate.

a. There is a 95 percent probability that the “true” effect size lies between the lower and upper limits. If the interval includes 0, the effect size is not statistically significant.

b. Weighted mean effect size.

Source: Authors’ analysis of primary data collected for the review; see appendix E.

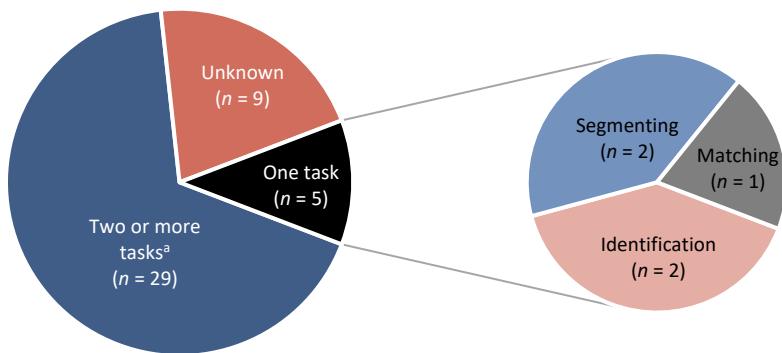
**Figure B7. Flowchart for interventions that taught and evaluated effectiveness on phonological awareness**



a. In single-case design studies the effect sizes and statistical significance are not estimated; instead, visual analysis is used to evaluate the effectiveness of an intervention. Single-case design studies are therefore not included in weighted effect size estimates.

Source: Authors' compilation.

**Figure B8. Phonological awareness tasks included in 43 interventions that taught and evaluated effectiveness on phonological awareness**



a. Interventions included two or more of the following tasks: Identification, matching, blending, counting, segmenting, or production.  
Source: Authors' compilation.

**Table B9. Average weighted effect size on phonological awareness outcomes, by domain taught**

Domain taught	Number of interventions	Hedges' $g^b$	Standard error	95 percent confidence interval <sup>a</sup>		p-value
				Lower limit	Upper limit	
Phonological awareness	36	0.32	0.04	0.23	0.41	<.001
Language but not phonological awareness	6	0.02	0.06	-0.10	0.14	.73
Language and print knowledge but not phonological awareness; language and early writing but not phonological awareness; or language, print knowledge, and early writing but not phonological awareness	7	0.03	0.09	-0.14	0.21	.71

a. There is a 95 percent probability that the “true” effect size lies between the lower and upper limits. If the interval includes 0, the effect size is not statistically significant.

b. Weighted mean effect size.

Source: Authors’ analysis of primary data collected for the review; see appendix E.

**Table B10. Weighted effect size on phonological awareness outcomes among interventions that taught and evaluated phonological awareness, by type of outcome measure**

Type of outcome measure	Number of interventions	Hedges' $g^b$	Standard error	95 percent confidence interval <sup>a</sup>		p-value
				Lower limit	Upper limit	
Standardized	27	0.28	0.04	0.20	0.37	<.001
Researcher-developed	12	0.43	0.11	0.22	0.64	<.001

Note: Of the 43 interventions that taught and evaluated effectiveness on phonological awareness, 36 were evaluated using a group design and included sufficient information to derive an effect size estimate and are represented in the table. Of the remaining 7, 5 were evaluated using a single-case design in which effect sizes were not estimated, and 2 were evaluated using a group design but did not include sufficient information to derive an effect size estimate.

a. There is a 95 percent probability that the “true” effect size lies between the lower and upper limits. If the interval includes 0, the effect size is not statistically significant.

b. Weighted mean effect size.

Source: Authors’ analysis of primary data collected for the review; see appendix E.

**Table B11. Average weighted effect size on phonological awareness outcomes among interventions that taught and evaluated phonological awareness, by instructional feature**

Instructional feature	Number of interventions	Hedges' $g^b$	Standard error	95 percent confidence interval <sup>a</sup>		p-value
				Lower limit	Upper limit	
Taught combination <sup>c</sup> of tasks	27	0.38	0.06	0.26	0.50	<.001

Note: Of the 43 interventions that taught and evaluated effectiveness on phonological awareness, 27 were evaluated using a group design and included sufficient information to derive an effect size, provided sufficient information to identify phonological awareness tasks, and are represented in the table. Of the remaining 16, 9 interventions were evaluated using a group design and included sufficient information to derive an effect size but either did not provide sufficient information to identify any phonological awareness tasks or taught a phonological awareness task that was coded as “other,” 5 were evaluated using a single-case design in which effect sizes were not estimated, 2 were evaluated using a group design but did not include sufficient information to derive an effect size estimate.

a. There is a 95 percent probability that the “true” effect size lies between the lower and upper limits. If the interval includes 0, the effect size is not statistically significant.

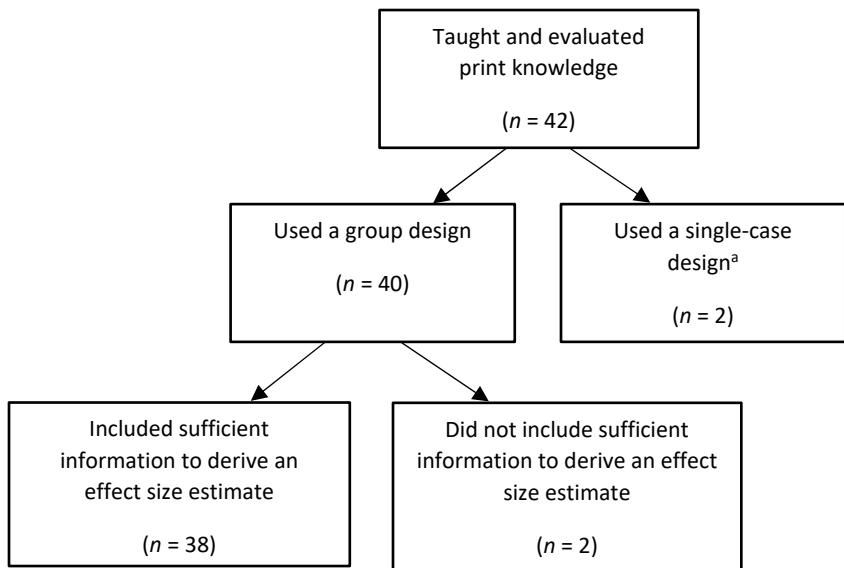
b. Weighted mean effect size.

c. A combination of tasks that includes one or more of the following tasks: identification, matching, blending, counting, segmenting, or production.

Source: Authors’ analysis of primary data collected for the review; see appendix E.

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**Figure B9. Flowchart for interventions that taught and evaluated effectiveness on print knowledge**

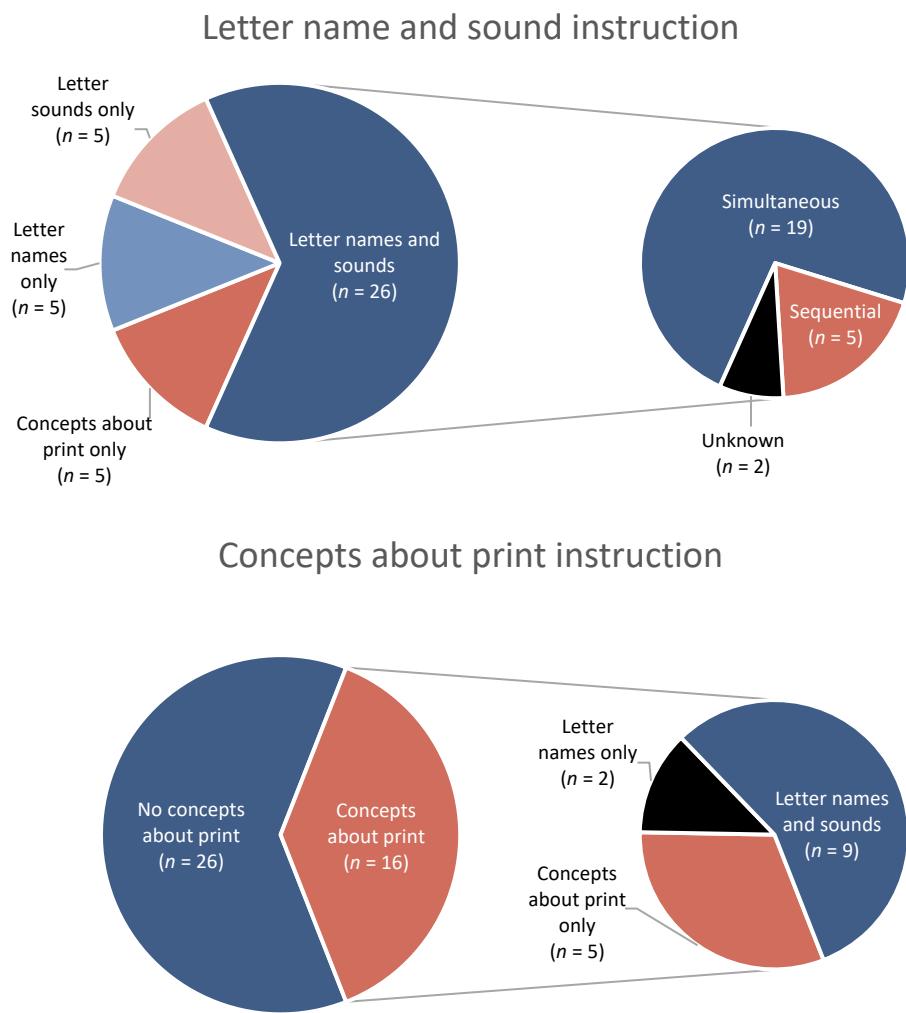


a. In single-case design studies the effect sizes and statistical significance are not estimated; instead, visual analysis is used to evaluate the effectiveness of an intervention. Single-case design studies are therefore not included in weighted effect size estimates.

Source: Authors' compilation.

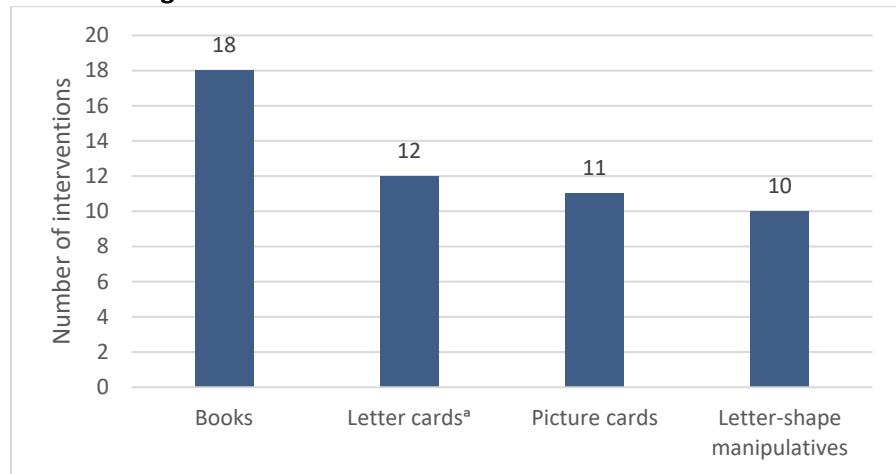
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**Figure B10. Print knowledge instructional features included in the 42 interventions that taught and evaluated effectiveness on print knowledge**



Sources: Authors' compilation.

**Figure B11. Print knowledge instructional materials included in the 42 interventions that taught and evaluated effectiveness on print knowledge**



a. Letter cards are with or without pictures.

Sources: Authors' compilation.

**Table B12. Average weighted effect size on print knowledge outcomes, by domain taught**

Domain taught	Number of interventions	Hedges' $g^b$	Standard error	95 percent confidence interval <sup>a</sup>		<i>p</i> -value
				Lower limit	Upper limit	
Print knowledge	38	0.23	0.05	0.13	0.33	<.001
Did not teach print knowledge	5	0.10	0.13	-0.15	0.35	.45
Phonological awareness and print knowledge	28	0.25	0.06	0.14	0.37	<.001
Print knowledge but not phonological awareness	10	0.09	0.07	-0.05	0.24	.22

a. There is a 95 percent probability that the "true" effect size lies between the lower and upper limits. If the interval includes 0, the effect size is not statistically significant.

b. Weighted mean effect size.

Source: Authors' analysis of primary data collected for the review; see appendix E.

**Table B13. Weighted effect size on print knowledge outcomes among interventions that taught and evaluated print knowledge, by type of outcome measure**

Type of outcome measure	Number of interventions	Hedges' $g^b$	Standard error	95 percent confidence interval <sup>a</sup>		<i>p</i> -value
				Lower limit	Upper limit	
Standardized	19	0.24	0.08	0.09	0.39	<.01
Researcher-developed	22	0.30	0.08	0.14	0.47	<.001

Note: Of the 42 interventions that taught and evaluated print knowledge, 38 were evaluated using a group design and included sufficient information to derive an effect size estimate and are represented in the table. Of the remaining 4, 2 were evaluated using a single-case design in which effect sizes were not estimated, and 2 were evaluated using a group design but did not include sufficient information to derive an effect size estimate.

a. There is a 95 percent probability that the "true" effect size lies between the lower and upper limits. If the interval includes 0, the effect size is not statistically significant.

b. Weighted mean effect size.

Source: Authors' analysis of primary data collected for the review; see appendix E.

**Table B14. Average weighted effect size on print knowledge outcomes among interventions that taught and evaluated print knowledge, by instructional feature**

Instructional feature	Number of interventions	Hedges' $g^b$	Standard error	95 percent confidence interval <sup>a</sup>		<i>p</i> -value
				Lower limit	Upper limit	
Taught both letter names and letter sounds	23	0.20	0.04	0.12	0.28	<.001
Taught either letter names or letter sounds but not both	9	0.16	0.06	0.03	0.28	.01
Taught concepts about print	15	0.32	0.13	0.08	0.57	.01
Did not teach concepts about print	22	0.18	0.04	0.09	0.26	<.001

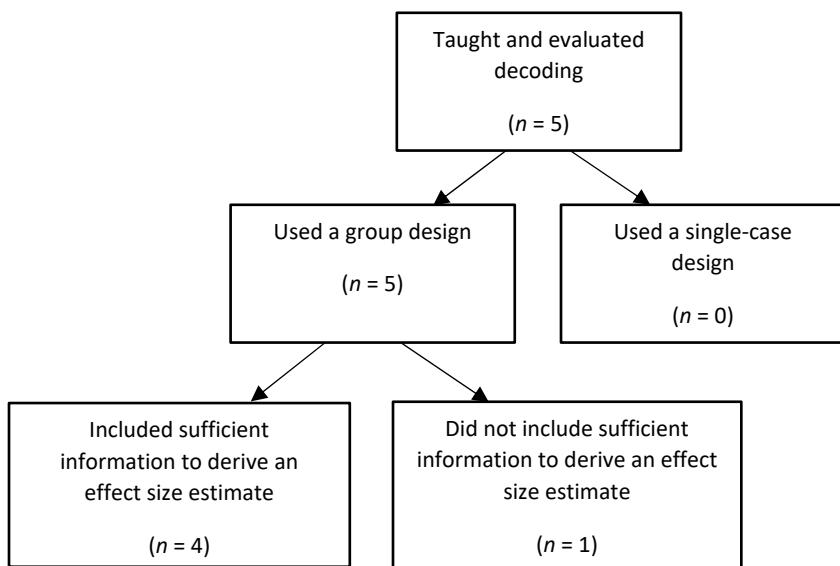
Note: Of the 42 interventions that taught and evaluated print knowledge, 38 were evaluated using a group design and included sufficient information to derive an effect size estimate and are represented in the table. Of the remaining 4, 2 were evaluated using a single-case design in which effect sizes were not estimated, and 2 were evaluated using a group design but did not include sufficient information to derive an effect size estimate.

a. There is a 95 percent probability that the “true” effect size lies between the lower and upper limits. If the interval includes 0, the effect size is not statistically significant.

b. Weighted mean effect size.

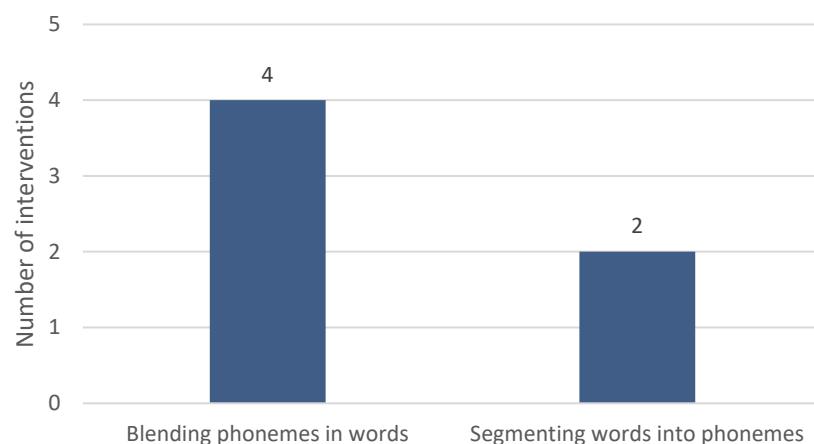
Source: Authors’ analysis of primary data collected for the review; see appendix E.

**Figure B12. Flowchart for interventions that taught and evaluated effectiveness on decoding**



Source: Authors’ compilation.

**Figure B13. Decoding instructional features included in the five interventions that taught and evaluated effectiveness on decoding**



Source: Authors' compilation.

**Table B15. Average weighted effect size on decoding outcomes, by domain taught**

Domain taught	Number of interventions	Hedges' $g^b$	Standard error	95 percent confidence interval <sup>a</sup>		<i>p</i> -value
				Lower limit	Upper limit	
Decoding, phonological awareness, and print knowledge	4	0.52	0.15	0.22	0.82	<.001
Phonological awareness and print knowledge but not decoding	13	0.22	0.07	0.09	0.36	<.001

a. There is a 95 percent probability that the "true" effect size lies between the lower and upper limits. If the interval includes 0, the effect size is not statistically significant.

b. Weighted mean effect size.

Source: Authors' analysis of primary data collected for the review; see appendix E.

**Table B16. Weighted effect size on decoding outcomes among interventions that taught and evaluated decoding, by type of outcome measure**

Type of outcome measure	Number of interventions	Hedges' $g^b$	Standard error	95 percent confidence interval <sup>a</sup>		<i>p</i> -value
				Lower limit	Upper limit	
Standardized	4	0.56	0.17	0.23	0.89	.001
Researcher-developed	2	0.45	0.15	0.16	0.75	<.01

Note: Of the five interventions that taught and evaluated decoding, four were evaluated using a group design and included sufficient information to derive an effect size estimate and are represented in the table. The remaining one was evaluated using a group design but did not include sufficient information to derive an effect size estimate.

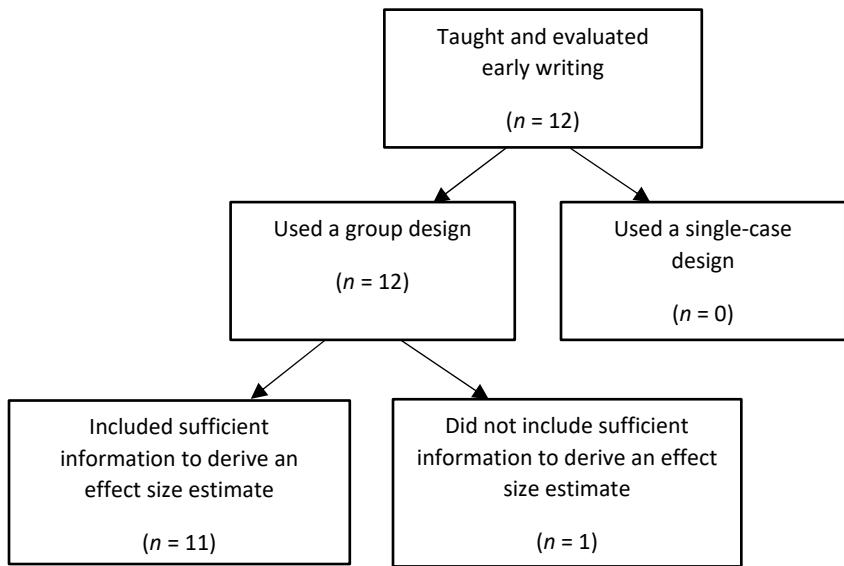
a. There is a 95 percent probability that the "true" effect size lies between the lower and upper limits. If the interval includes 0, the effect size is not statistically significant.

b. Weighted mean effect size.

Source: Authors' analysis of primary data collected for the review; see appendix E.

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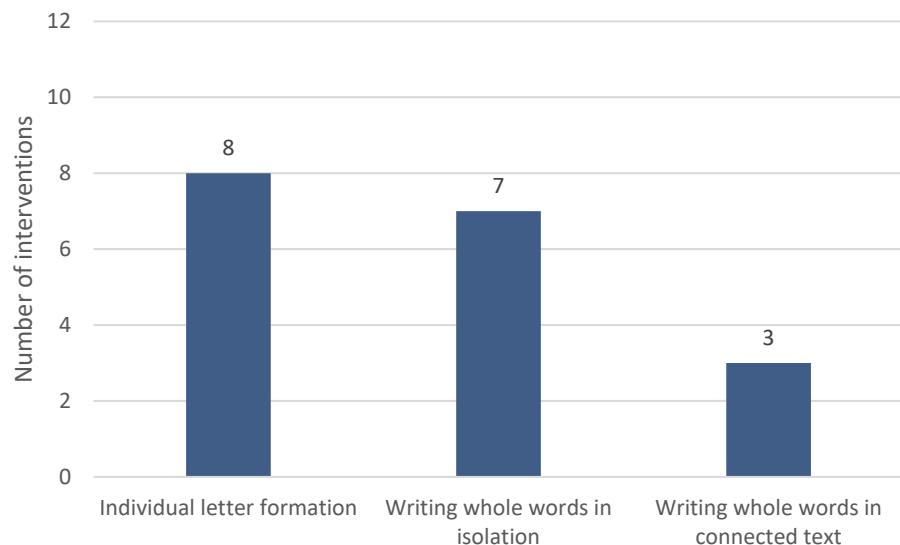
**Figure B14. Flowchart for interventions that taught and evaluated effectiveness on early writing**



Source: Authors' compilation.

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**Figure B15. Early writing instructional features included in the 12 interventions that taught and evaluated effectiveness on early writing**



Source: Authors' compilation.

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**Table B17. Average weighted effect size on writing outcomes, by domain taught**

Domain taught	Number of interventions	Hedges' $g^b$	Standard error	95 percent confidence interval <sup>a</sup>		p-value
				Lower limit	Upper limit	
Early writing	11	0.32	0.13	0.06	0.58	.02
Early writing, phonological awareness, and print knowledge	6	0.41	0.14	0.14	0.69	.003
Early writing but not phonological awareness and print knowledge	5	0.18	0.24	-0.29	0.64	.45
Phonological awareness and print knowledge but not early writing	6	0.33	0.09	0.16	0.51	<.001

a. There is a 95 percent probability that the “true” effect size lies between the lower and upper limits. If the interval includes 0, the effect size is not statistically significant.

b. Weighted mean effect size.

Source: Authors’ analysis of primary data collected for the review; see appendix E.

**Table B18. Weighted effect size on early writing outcomes among interventions that taught and evaluated early writing, by type of outcome measure**

Type of outcome measure	Number of interventions	Hedges' $g^b$	Standard error	95 percent confidence interval <sup>a</sup>		p-value
				Lower limit	Upper limit	
Standardized	4	0.23	0.26	-0.28	0.75	.37
Researcher-developed	7	0.36	0.12	0.13	0.59	<.01

Note: Of the 12 interventions that taught and evaluated early writing, 11 were evaluated using a group design and included sufficient information to derive an effect size estimate and are represented in the table. The remaining one was evaluated using a group design but did not include sufficient information to derive an effect size estimate.

a. There is a 95 percent probability that the “true” effect size lies between the lower and upper limits. If the interval includes 0, the effect size is not statistically significant.

b. Weighted mean effect size.

Source: Authors’ analysis of primary data collected for the review; see appendix E.

**Table B19. Average weighted effect size on early writing outcomes among interventions that taught and evaluated early writing, by instructional feature**

Instructional feature	Number of interventions	Hedges' $g^b$	Standard error	95 percent confidence interval <sup>a</sup>		p-value
				Lower limit	Upper limit	
Instruction focused on individual letter formation	8	0.35	0.13	0.11	0.60	<.01
Instruction did not focus on individual letter formation	2	0.62	0.23	0.17	1.07	<.01
Instruction focused on whole words in isolation	6	0.43	0.15	0.13	0.73	<.01
Instruction did not focus on whole words in isolation	4	0.34	0.18	-0.02	0.70	.07

Note: Of the 12 interventions that taught and evaluated early writing, 10 were evaluated using a group design and included sufficient information to derive an effect size estimate, provided sufficient information to identify early writing instructional features, and are represented in the table. Of the remaining 2, 1 was evaluated using a group design that included sufficient information to derive an effect size but did not provide sufficient information to identify any early writing instructional features, and 1 was evaluated using a group design but did not include sufficient information to derive an effect size estimate.

a. There is a 95 percent probability that the “true” effect size lies between the lower and upper limits. If the interval includes 0, the effect size is not statistically significant.

b. Weighted mean effect size.

Source: Authors’ analysis of primary data collected for the review; see appendix E.

## **Reference**

What Works Clearinghouse. (2017). *What Works Clearinghouse standards handbook version 4.0*. U.S. Department of Education, Institute of Education Sciences.

## Appendix C. Effects of interventions by domain and type of outcome measure for the 132 interventions evaluated by high-quality impact studies

**Table C1. Effects of the 132 interventions evaluated by high-quality impact studies, by outcome domain, type of outcome measure, and study design**

Intervention	Language		Phonological awareness		Print knowledge		Decoding		Early writing		General literacy	
	RD	S	RD	S	RD	S	RD	S	RD	S	RD	S
<b>Group design (n = 118)</b>												
Phonology with Reading (P + R) program (Bowyer-Crane et al., 2008)			○	●	●		●	●	●			
Nuffield Early Language Intervention—30 week (Fricke et al., 2013)	●	●	●	○	●				○	○		
Jumpstart (Harris, 2010)			● <sup>a</sup>		○ <sup>a</sup>		● <sup>a</sup>				● <sup>a</sup>	
Emergent literacy intervention (Bailet et al., 2009)			●		●		●					○
Interactive reading and writing intervention (Thompson, 2015)	○		●		●		○		○	○	○	○
Funnix Beginning Reading computer program (Stockard, 2009)				●		○	○	●				
Letter manipulation plus articulation (Boyer, 2010)			○		○		●		●			
Head Start REDI (Bierman et al., 2008)			●		●		○					
Enriched literacy intervention (Ciancio, 2004)				●		● <sup>c</sup>						
Stony Brook Emergent Literacy Project (Massetti, 2009) <sup>b</sup>					●		●					
Rhyming/alliteration intervention (Yeh, 2003) <sup>b</sup>					●		●					
Integrated Phonics (Smith, 1998)									●	●		
DLM Early Childhood Express supplemented with Open Court Reading Pre-K (Preschool Curriculum Evaluation Research Consortium, 2008h)			○		○				○	○	●	
Nuffield Early Language Intervention—30 week (Fricke et al., 2017)	●	○				○	○					
Tier 2: Intensive language- and code-focused intervention for children who qualified for language-focused or language- and code-focused intervention (study 2) (Lonigan & Phillips, 2016)					●	○	○					○
Literacy Express Preschool Curriculum plus workshop and in-class mentoring (Lonigan et al., 2011)			○		○		●					
PAth to Literacy (Goldstein et al., 2017)			○		●		○					
Narrative Dynamics and story reenactment (Sa, 2012)	●	○										
Educative curriculum material supports (Neuman et al., 2015)	●	○										

Intervention	Language		Phonological awareness		Print knowledge		Decoding		Early writing		General literacy	
	RD	S	RD	S	RD	S	RD	S	RD	S	RD	S
Interactive book reading (Wasik & Bond, 2001)	●	○ <sup>a</sup>										
Professional development on responsiveness education (Cabell et al., 2011) <sup>b</sup>	○				●							
Let's Begin with the Letter People with mentoring (Assel et al., 2007)	○								●			
Professional development with media-rich literacy supplement (Penuel et al., 2012)					○ <sup>a</sup>		● <sup>a</sup>					
Writing using iPad and finger (Patchan & Puranik, 2016)						○			●			
Storybook reading with eliciting vocabulary questions (Walsh & Blewitt, 2006)	●											
Storybook reading with noneliciting vocabulary questions (Walsh & Blewitt, 2006)	●											
Responsive teaching and explicit instruction (Hong & Diamond, 2012) <sup>b</sup>	●											
Storybook reading with questions (Zhou, 2014)	●											
Storybook reading with ostensive questions and feedback (Langan, 2010)	●											
Explicit expository book reading (Bochna, 2006)	●											
Talk Boost (Lee & Pring, 2016)			●									
Computer-assisted instruction (Lonigan et al., 2003)				●								
Print-focused storybook reading (Justice, 2000)					●			●				
Building Blocks for Literacy with distance mentoring (Lane et al., 2014)									●			
Bright Beginnings curriculum (Preschool Curriculum Evaluation Research Consortium, 2008a)	○	○				○		○		○		○
Creative Curriculum (Preschool Curriculum Evaluation Research Consortium, 2008a)	○	○				○		○		○		○
Creative Curriculum (Preschool Curriculum Evaluation Research Consortium, 2008b)	○	○				○		○		○		○
Curiosity Corner curriculum (Preschool Curriculum Evaluation Research Consortium, 2008d)	○	○				○		○		○		○
Language-Focused Curriculum (Preschool Curriculum Evaluation Research Consortium, 2008g)	○	○				○		○		○		○
Literacy Express preschool curriculum (Preschool Curriculum Evaluation Research Consortium, 2008h)	○	○				○		○		○		○
Nuffield Early Language Intervention—20 week (Fricke et al., 2017)	○	○			○		○		○		○	
Ready, Set, Leap! (RMC Research Corporation, 2003)	○	○			○		○		○		○	
Ready, Set, Leap! (Davidson et al., 2009)	○	○			○		○		○		○	
Oral language intervention (L4R) (Haley et al., 2017)	○	○			○		○		○		○	





Intervention	Language		Phonological awareness		Print knowledge		Decoding		Early writing		General literacy	
	RD	S	RD	S	RD	S	RD	S	RD	S	RD	S
Words of Oral Reading and Language Development (Pollard-Durodola et al., 2011)			○									
Story Friends with embedded lessons (Goldstein et al., 2016)			○									
Literate language intervention (Phillips et al., 2016)			○									
My Sentence Builder (Washington et al., 2011)			○									
Nonphonically decodable vocabulary with mixed teaching methods (Price-Mohr & Price, 2017) <sup>b</sup>			○									
Music therapy activities with singing of books (Clouser, 2001) <sup>b</sup>			○									
Tier 2: Intensive code- and language-focused intervention for children who qualified for code-focused or code- and language-focused intervention (study 2) (Lonigan & Phillips, 2016)			○									
Dialogic reading with emotion-laden storybooks (Mincic, 2009) <sup>b</sup>			○ <sup>a</sup>									
Phonological awareness training (Majsterek et al., 2000)			○									
Computer-assisted instruction—Early Reading (Macaruso & Rodman, 2011) <sup>b</sup>			○									
Rhyme training (Desmond, 2008)			○									
Whole-class phonological awareness training with supplemental small-group instruction (Guidry, 2003)			○									
Creative Curriculum with Ladders to Literacy (Preschool Curriculum Evaluation Research Consortium, 2008c) <sup>b</sup>			○									
CD-ROM (IBM's Stories and More) (Talley et al., 1997)			○									
eBook reading—Action (Gong & Levy, 2009)			○									
eBook reading—Bouncing ball (Gong & Levy, 2009)			○									
eBook reading—Violation (Gong & Levy, 2009)			○									
Kindergarten Peer Assisted Literacy Strategies and Developing Talkers (Mannes, 2013) <sup>b</sup>									○ <sup>a</sup>			
Doors to Discovery without mentoring (Assel et al., 2007)									○			
Phoneme segmentation training using letters to spell (O'Leary, 2017) <sup>b</sup>										○		
Teaching Early Literacy and Language curriculum (Wilcox et al., 2011) <sup>b</sup>											○	
Performance-oriented storybook reading (Witt, 2000)			○			○			○			
Read aloud fiction and nonfiction books (Cesar, 2013)			○			○			○			

Intervention	Language		Phonological awareness		Print knowledge		Decoding		Early writing		General literacy	
	RD	S	RD	S	RD	S	RD	S	RD	S	RD	S
Electronic alphabet book reading (Willoughby et al., 2015) <sup>b</sup>					○	○						
Electronic picturebooks (Allison, 2016)					○				○			
Project Approach (Preschool Curriculum Evaluation Research Consortium, 2008i)			○		○				○	○	○	
Single-case design ( <i>n</i> = 14)												
Modified PAth to Literacy (Olszewski, 2015)					●		●					
Book reading and Enhanced Milieu Teaching play (McLeod et al., 2017) <sup>b</sup>					●							
Book reading and play sessions (Stanton-Chapman et al., 2012)					●							
Multiple skill phonological awareness instruction (Lovelace, 2008) <sup>b</sup>					●							
Grammatically complete and incomplete prompts to imitate (Bredin-Oja, 2012)					○							
Play sessions (Craig-Unkefer, 1999)					○							
Peer play (Craig-Unkefer & Kaiser, 2002)					○							
Milieu teaching strategy (Sheldon, 1997) <sup>b</sup>					○							
Book reading and play (Stanton-Chapman, 2004)					○							
Video self-modeling (Whitlow, 2003) <sup>b</sup>					○							
Phonological awareness instruction (Hsin, 2007)					○				○			
Phonological awareness intervention (Kruse, 2013) <sup>b</sup>					○							
Phonological awareness intervention (first sound identification) (Noe et al., 2014) <sup>b</sup>							○					
iPad instruction of target verb (Dennis et al., 2016)					□							

● is effective (see box B1).

○ is inconclusive (see box B1).

□ is not effective (see box B1).

RD is researcher-developed outcome.

S is standardized outcome.

Note: See appendix F for the complete citation associated with each study evaluating the interventions.

a. There is not enough information provided in the manuscript to calculate effect size.

b. Study was rated as a high-quality quasi-experimental study as opposed to a high-quality experimental study.

Source: Authors' compilation.

## Appendix D. Implementation characteristics of the 132 interventions evaluated by high-quality impact studies

**Table D1. Implementation characteristics of the 132 interventions evaluated by high-quality impact studies, by study design and intervention type**

Intervention name	Grouping	Intensity and duration	Total instruction (hours)	Time					Instructional domain			Implementation							
				L	PA	PK	D	W	Lesson plan	Interventionist	Prior PD provided	Ongoing support							
<b>Group design (n = 118)</b>																			
<i>Curriculum</i>																			
At risk Tier 2: Developing Talkers (Zucker et al., 2013)	W, S	30 minute sessions, 10 sessions per week for 4 weeks	2–25	v					v	T	v	v							
Bright Beginnings curriculum (Preschool Curriculum Evaluation Research Consortium, 2008a)	W	5 sessions per week for whole school year	More than 60	v						T	v	v							
Creative Curriculum (Preschool Curriculum Evaluation Research Consortium, 2008a)	W	5 sessions per week for whole school year	More than 60	v						T	v	v							
Creative Curriculum (Preschool Curriculum Evaluation Research Consortium, 2008b)	W	5 sessions per week for whole school year	More than 60	v						T	v	v							
Curiosity Corner curriculum (Preschool Curriculum Evaluation Research Consortium, 2008d)	W	5 sessions per week for whole school year	More than 60	v						T	v	v							
DLM Early Childhood Express supplemented with Open Court Reading Pre-K (Preschool Curriculum Evaluation Research Consortium, 2008h)	W	5 sessions per week for whole school year	More than 60	v	v	v				T	v	v							
Doors to Discovery (Christie et al., 2003)	W, S	5 sessions per week for 12 weeks	2–25	v	v	v			v	T	v	v							
Doors to Discovery without mentoring (Assel et al., 2007)	W, S, I	Whole school year	More than 60	v	v	v			v	T	v	v							
Head Start REDI (Bierman et al., 2008)	W, I	3–4 sessions per week for 25 weeks	More than 60	v	v	v			v	T, O	v	v							
Language-Focused Curriculum (Preschool Curriculum Evaluation Research Consortium, 2008g)	W	Whole school year	More than 60	v						T	v	v							

Intervention name	Grouping	Intensity and duration	Total instruction (hours)	Time					Instructional domain			Implementation			
				L	PA	PK	D	W	Lesson plan	Interventionist	Prior PD provided	Ongoing support			
Let's Begin with the Letter People (Fischel et al., 2007)	W, L, S	Whole school year	More than 60	✓	✓	✓			✓	T	✓	✓			
Let's Begin with the Letter People with mentoring (Assel et al., 2007)	W, S, I	26 weeks	More than 60	✓	✓	✓			✓	T	✓	✓			
Literacy Express Preschool Curriculum (Preschool Curriculum Evaluation Research Consortium, 2008h)	W, L, S	5 sessions per week for whole school year	More than 60	✓		✓				T	✓	✓			
Literacy Express Preschool Curriculum plus workshop and in-class mentoring (Lonigan et al., 2011)	L, S	Whole school year	More than 60	✓	✓	✓			✓	T	✓	✓			
Phonology with Reading (P + R) program (Bowyer-Crane et al., 2008)	S, I	25 minute sessions, 5 sessions per week for 20 weeks	25–50	✓	✓	✓	✓	✓	✓	T	✓	✓			
Ready, Set, Leap! (Davidson et al., 2009)	W, S, I	90 minute per day for the whole school year	More than 60	✓		✓			✓	T, TECH+	✓	✓			
Ready, Set, Leap! (RMC Research Corporation, 2003)	I	Whole school year	More than 60	✓	✓	✓				TECH					
Stepping Stones to Literacy (Nelson et al., 2009)	S	20 minute sessions, 2–3 sessions per week for 10 weeks	2–25	✓	✓	✓			✓	O	✓	✓			
Teaching Early Literacy and Language curriculum (Wilcox et al., 2011)	L, S	150 minute sessions, 4 sessions per week for 40 weeks	More than 60	✓	✓	✓			✓	T	✓	✓			
Waterford Early Reading (Fischel et al., 2007)	L, S, I	15 minute sessions, 116 sessions in 30 weeks	25–50	✓	✓	✓				T, TECH	✓	✓			

Intervention name	Grouping	Intensity and duration	Time Total instruction (hours)	Instructional domain					Implementation			
				L	PA	PK	D	W	Lesson plan	Interven-tionist	Prior PD provided	Ongoing support
<i>Instructional practice</i>												
Dialogic reading (Lonigan et al., 1999)	S	10–15 minute sessions, 4–5 sessions per week for 6 weeks	2–25	✓						R	✓	✓
Dialogic reading and letter knowledge (Lonigan et al., 2013)	S	15 minute sessions, 5 sessions per week for 32 weeks	25–50	✓	✓					R	✓	✓
Dialogic reading and phonological awareness intervention (Lonigan et al., 2013)	S	15 minute sessions, 5 sessions per week for 32 weeks	25–50	✓	✓					R	✓	✓
Dialogic reading with emotion-laden storybooks (Mincic, 2009)	S	10–15 minute sessions, 3 sessions per week for 12 weeks	2–25	✓					✓	T	✓	✓
Dialogic reading, phonological awareness, and letter knowledge (Lonigan et al., 2013)	S	15 minute sessions, 5 sessions per week for 32 weeks	25–50	✓	✓	✓				R	✓	✓
Educative curriculum material supports (Neuman et al., 2015)	W	10–15 minute sessions, 5 sessions per week for 12 weeks	2–25	✓					✓	T	✓	✓
Electronic alphabet book reading (Willoughby et al., 2015) <sup>1</sup>	S	20 minute sessions, 2 sessions per week for 8 weeks	2–25	✓	✓	✓		✓		R, O, TECH+	U	U
Emergent Literacy intervention (Bailey et al., 2009)	S, I	30 minute sessions, 2 sessions per week for 9 weeks	2–25	✓	✓	✓		✓	✓	R, O	✓	✓
Emergent literacy intervention (Scott, 2005)	W	15–20 minute sessions, 4 sessions per week for 12 weeks	2–25	✓	✓	✓	✓	✓	✓	T	✓	✓
Enhancing language and social skills using evidence-based practices (Esler, 2001)	L, S, I	5 sessions per week for 18 weeks	25–50	✓	✓					T	✓	✓
Enriched literacy intervention (Ciancio, 2004)	I	15 sessions	2–25	✓	✓	✓				R	✓	

Intervention name	Grouping	Intensity and duration	Total instruction (hours)	Instructional domain					Implementation			
				L	PA	PK	D	W	Lesson plan	Interventionist	Prior PD provided	Ongoing support
Environmental print (Neumann et al., 2013)	S	30 minute sessions, 1 session per week for 8 weeks	2–25	✓		✓		✓	✓	R	U	U
Explicit emergent literacy intervention (Justice et al., 2003)	S	30 minute sessions, 2 sessions per week for 6 weeks	2–25		✓	✓		✓	✓	O	✓	✓
Explicit expository book reading (Bochna, 2006)	S	11 minute sessions, 14 sessions in 5 weeks	2–25	✓					✓	R		
Interactive book reading (Wasik & Bond, 2001)	W, S	4 sessions per week for 15 weeks	2–25	✓					✓	R, T	✓	✓
Interactive reading and writing intervention (Thompson, 2015)	L,	20–25 minute sessions, 4 sessions per week for 13 weeks	2–25	✓	✓	✓	✓	✓	✓	T	✓	✓
Jumpstart (Harris, 2010)	S, I	4 hours per week for 30 weeks	More than 60	✓						O	✓	
Letter manipulation plus articulation (Boyer, 2010)	I	2.48 hours on average	2–25	✓	✓	✓		✓	✓	R	U	U
Letter name letter sounds intervention (Piasta, 2008)	S	10–15 minute sessions, 3–4 sessions per week for 8 weeks	2–25	✓	✓	✓		✓	✓	R	✓	✓
Letter sounds only intervention (Piasta, 2008)	S	10–15 minute sessions, 3–4 sessions per week for 8 weeks	2–25	✓	✓	✓		✓	✓	R	✓	✓
Library with additional supports (Neuman, 2017)	W, I	Whole school year	More than 60	✓						T, O	✓	✓
Literate language intervention (Phillips et al., 2016)	S	20–25 minute sessions, 3–4 sessions per week for 12 weeks	2–25	✓					✓	R	✓	✓
Morphosyntax intervention (Tyler et al., 2003)	S, I	35–40 minute sessions, 2 sessions per week for 12 weeks	2–25	✓					✓	O	✓	

Intervention name	Grouping	Intensity and duration	Total instruction (hours)	Instructional domain					Implementation			
				L	PA	PK	D	W	Lesson plan	Interventionist	Prior PD provided	Ongoing support
Multimedia story reading with questions (Zhou, 2014)	I	2 sessions in 2 weeks	Less than 2	✓						R, TECH+	U	U
Music therapy activities with singing of books (Clouser, 2001)	L	20 minute sessions, 4 sessions per week for 4 weeks	2–25	✓					✓	O		
My Sentence Builder (Washington et al., 2011)	I	20 minute sessions, 1 session per week for 10 weeks	2–25	✓						R, TECH+	U	U
Narrative Dynamics and story reenactment (Sa, 2012)	S	25 minute sessions, 2 sessions per week for 8 weeks	2–25	✓					✓	R	U	U
Nonphonically decodable vocabulary with mixed teaching methods (Price-Mohr & Price, 2017)	W	Whole school year	More than 60	✓		✓			✓	T	✓	✓
Paper alphabet book reading (Willoughby et al., 2015)	S	20 minute sessions, 2 sessions per week for 8 weeks	2–25	✓	✓	✓				R	U	U
Performance-oriented storybook reading (Witt, 2000)	S	30 minute sessions, 3 sessions per week for 6 weeks	2–25	✓					✓	R	U	U
Phoneme segmentation training using letters to spell (O’Leary, 2017)	I	1 session for 15 minutes	Less than 2		✓	✓	✓			R	U	U
Phonological awareness training (Majsterek et al., 2000)	W	10 minute sessions, 9 sessions in 4 weeks	Less than 2		✓					R		
Phonological awareness training plus letter knowledge training (Pietrangelo, 1999)	W, S,	30–35 minute sessions, 22 sessions per week for 12 weeks	More than 60	✓	✓	✓	✓	✓	✓	T	✓	✓
Print awareness curriculum plus phonological awareness intervention (Gillis, 1998)	S, I	10–15 minute sessions, 2 sessions per week for 12 weeks	2–25	✓	✓	✓		✓		R	U	U
Print-focused storybook read aloud with high-dose print referencing (Justice et al., 2010)	W	4 sessions per week for 30 weeks	More than 60	✓		✓		✓	✓	T	✓	✓

Intervention name	Grouping	Intensity and duration	Total instruction (hours)	Instructional domain					Implementation			
				L	PA	PK	D	W	Lesson plan	Interventionist	Prior PD provided	Ongoing support
Print-focused storybook reading (Justice, 2000)	S	5 minute sessions, 3 sessions per week for 8 weeks	2–25	✓		✓			✓	R	U	U
Professional development on responsiveness education (Cabell et al., 2011)	W	24 weeks	More than 60		✓					T	✓	✓
Professional development with media-rich literacy supplement (Penuel et al., 2012)	W, S, I	34 minute sessions, 5 sessions per week for 10 weeks	2–25	✓	✓	✓			✓	R, T	✓	✓
Project Approach (Preschool Curriculum Evaluation Research Consortium, 2008i)	W, S	50–55 minute sessions, 5 sessions per week for whole school year	More than 60		✓				✓	T	✓	✓
Read aloud with fiction and nonfiction books (Cesar, 2013)	W	8 sessions in 8 weeks	2–25	✓		✓			✓	R	U	U
Ready to Learn (Brigman et al., 1999)	W	2 hours per week for 12 weeks	2–25	✓						T	✓	✓
Responsive teaching and explicit instruction (Hong & Diamond, 2012)	S	15 minute sessions, 4 sessions in 2–3 weeks	Less than 2	✓					✓	R	U	U
Rhyme training (Desmond, 2008)	S	15 minute sessions, 4 sessions per week for 7 weeks	2–25		✓				✓	T	U	U
Rhyming/alliteration intervention (Yeh, 2003)	S	20–25 minute sessions, 2 sessions per week for 9 weeks	2–25		✓	✓		✓		T		✓
Storybook reading + retelling (Leung, 2008)	S, I	3 sessions per week for 4 weeks	2–25	✓					✓	R, T	✓	
Storybook reading focusing on narrative (Callahan, 2003)	S	35 minute sessions, 2 sessions per week for 10 weeks	2–25	✓		✓				R	✓	
Storybook reading with elaboration (Lima, 2008)	W	3 sessions in 1 week	Less than 2	✓					✓	T	✓	

Intervention name	Grouping	Intensity and duration	Total instruction (hours)	Instructional domain					Implementation			
				L	PA	PK	D	W	Lesson plan	Interventionist	Prior PD provided	Ongoing support
Storybook reading with eliciting vocabulary questions (Walsh & Blewitt, 2006)	I	4 sessions in 6 weeks	Less than 2	✓					✓	R	U	U
Storybook reading with eliciting vocabulary questions (Walsh, 2009)	I	4 sessions in 6 weeks	Less than 2	✓					✓	R	✓	
Storybook reading with eliciting vocabulary questions with full scaffolded questions and comments (Wyant, 2008)	I	1 session per week for 3 weeks	Less than 2	✓					✓	R	U	U
Storybook reading with full scaffolded questions and comments (Palmiter, 2013)	I	2 sessions in 2 weeks	Less than 2	✓					✓	R	U	U
Storybook reading with noneliciting vocabulary questions (Walsh & Blewitt, 2006)	I	4 sessions in 6 weeks	Less than 2	✓					✓	R	U	U
Storybook reading with noneliciting vocabulary questions (Walsh, 2009)	I	4 sessions in 6 weeks	Less than 2	✓					✓	R	✓	
Storybook reading with ostensive questions and feedback (Langan, 2010)	I	2 sessions	Less than 2	✓						R	U	U
Storybook reading with questions (Zhou, 2014)	I	2 sessions in 2 weeks	Less than 2	✓						R	U	U
Storybook reading with scaffolded questions and feedback (Langan, 2010)	I	2 sessions	Less than 2	✓					✓	R	U	U
Storybook reading with scaffolding-like questions (study 2) (Blewitt et al., 2009)	I	4 sessions	Less than 2	✓					✓	R	U	U
Storybook reading, phonological awareness, and letter knowledge (Lonigan et al., 2013)	S	15 minute sessions, 5 sessions per week for 32 weeks	25–50	✓	✓	✓				R	✓	✓
Talking buddies (Ruston & Schwanenflugel, 2010)	S	25 minute sessions, 2 sessions per week for 10 weeks	2–25	✓						R	✓	✓
Tier 2: Code- and language-focused intervention for children who qualified for code-focused or code- and language-focused intervention (study 1) (Lonigan & Phillips, 2016)	S	40 minute sessions, 4 sessions per week for 11 weeks	25–50	✓	✓	✓			✓	R	✓	✓

Intervention name	Grouping	Time		Instructional domain					Implementation			
		Intensity and duration	Total instruction (hours)	L	PA	PK	D	W	Lesson plan	Interventionist	Prior PD provided	Ongoing support
Tier 2: Intensive code- and language-focused intervention for children who qualified for code-focused or code- and language-focused intervention (study 2) (Lonigan & Phillips, 2016)	S	40 minute sessions, 4 sessions per week for 11 weeks	25–50	✓	✓	✓			✓	R	✓	✓
Tier 2: Intensive language- and code-focused intervention for children who qualified for language-focused or language- and code-focused intervention (study 2) (Lonigan & Phillips, 2016)	S	40 minute sessions, 4 sessions per week for 11 weeks	25–50	✓	✓	✓			✓	R	✓	✓
Tier 2: Language- and code-focused intervention for children who qualified for language-focused or language- and code-focused intervention (study 1) (Lonigan & Phillips, 2016)	S	40 minute sessions, 4 sessions per week for 11 weeks	25–50	✓	✓	✓			✓	R	✓	✓
Universal Quality Literacy Practices plus PAVED for Success program focus on phonological awareness and explicit vocabulary enhancement practices (Schwanenflugel et al., 2010)	W, S	Whole school year	More than 60	✓	✓	✓			✓	T	✓	✓
Whole-class phonological awareness training with supplemental small-group instruction (Guidry, 2003)	W, S	15–20 minute sessions, 4–5 sessions per week for 6 weeks	2–25	✓						R	U	U
Writing using iPad and finger (Patchan & Puranik, 2016)	S	20 minute sessions, 3 sessions per week for 8 weeks	2–25		✓	✓				R	U	U
Writing using iPad and stylus (Patchan & Puranik, 2016)	S	20 minute sessions, 3 sessions per week for 8 weeks	2–25		✓	✓				R	U	U

Intervention name	Grouping	Intensity and duration	Time Total instruction (hours)	Instructional domain					Implementation			
				L	PA	PK	D	W	Lesson plan	Interven-tionist	Prior PD provided	Ongoing support
<i>Lesson package</i>												
Building Blocks for Literacy with distance mentoring (Lane et al., 2014)	W	6 months	2–25	✓	✓	✓			✓	T	✓	✓
Creative Curriculum with Ladders to Literacy (Preschool Curriculum Evaluation Research Consortium, 2008c)	W	5 sessions per week for whole school year	More than 60	✓		✓				T	✓	✓
Integrated Phonics (Smith, 1998)	W, S, I	20 weeks	More than 60	✓	✓	✓	✓	✓	✓	T	U	U
Kindergarten Peer Assisted Literacy Strategies and Developing Talkers (Mannes, 2013)	L, S	35–40 minute sessions, 4 sessions per week for 12 weeks	25–50	✓	✓	✓	✓		✓	T	✓	✓
Ladders to Literacy + Creative Curriculum (Russell, 2005)	W	Whole school year	More than 60	✓	✓	✓			✓	T	✓	✓
Let's Decode (Callcott et al., 2015)	W,	15 minute sessions, 5 sessions per week for whole school year	More than 60		✓	✓	✓		✓	T	✓	✓
Let's Decode plus Moving on with Literacy (Callcott et al., 2015)	W, S,	30 minute sessions, 5 sessions per week for whole school year	More than 60		✓	✓	✓		✓	T	✓	✓
Literacy Express Preschool Curriculum + Pre-K Mathematics Curriculum + PATHS Explicit (Lonigan et al., 2015)	W, S	Whole school year	More than 60	✓	✓	✓		✓	✓	T	✓	✓
Literacy Express Preschool Curriculum + Pre-K Mathematics Curriculum + PATHS Implicit (Lonigan et al., 2015)	W, S	Whole school year	More than 60	✓	✓	✓		✓	✓	T	✓	✓
Nuffield Early Language Intervention—30 week (Fricke et al., 2013)	S, I	45 minutes per week, for 10 weeks then 120 minutes per week for 20 weeks	25–50	✓	✓	✓			✓	T	✓	✓

Intervention name	Grouping	Intensity and duration	Total instruction (hours)	Instructional domain					Implementation			
				L	PA	PK	D	W	Lesson plan	Interventionist	Prior PD provided	Ongoing support
Nuffield Early Language Intervention—30 week (Fricke et al., 2017)	S, I	45 minutes per week for 10 weeks then 120 minutes per week for 20 weeks	25–50	✓	✓	✓			✓	T	✓	✓
Nuffield Early Language Intervention—20 week (Fricke et al., 2017)	S, I	120 minutes per week for 20 weeks	25–50	✓	✓	✓			✓	T	✓	✓
Oral language program (Bowyer-Crane et al., 2008)	S, I	25 minute sessions, 5 sessions per week for 20 weeks	25–50	✓				✓	✓	T	✓	✓
Oral language intervention (L4R) (Haley et al., 2017)	W	20 minute sessions, 3 sessions per week for 15 weeks	2–25	✓					✓	T	✓	✓
Path to Literacy (Goldstein et al., 2017)	S	10 minute sessions, 29 sessions in 15 weeks	2–25	✓	✓				✓	T	✓	✓
Stony Brook Emergent Literacy Project (Massetti, 2009)	W	Whole school year	More than 60	✓	✓	✓	✓		✓	T	✓	✓
Talk Boost (Lee & Pring, 2016)	W, S	30 minute sessions, 3 sessions per week for 10 weeks	2–25	✓					✓	T, O	✓	
Words of Oral Reading and Language Development (Pollard-Durodola et al., 2011)	L	15–20 minute sessions, 5 sessions per week for 12 weeks	2–25	✓					✓	T	✓	✓
<i>Technology program</i>												
Computer-assisted instruction—Early Reading (Macaruso & Rodman, 2011)	I	10 minute sessions, 20 sessions	2–25	✓	✓					TECH	✓	
CD-ROM (IBM's Stories and More) (Talley et al., 1997)	S	10–15 minute sessions, 12 sessions total	2–25	✓						TECH+	U	U
Computer-assisted instruction (Lonigan et al., 2003)	I	3–4 sessions per week for 8 weeks	2–25	✓						TECH+	U	U

Intervention name	Grouping	Intensity and duration	Total instruction (hours)	Instructional domain					Implementation			
				L	PA	PK	D	W	Lesson plan	Interventionist	Prior PD provided	Ongoing support
Digital storybook with interactive features (Kelley & Kinney, 2017)	I	3 sessions in 2 weeks	Less than 2	✓					✓	TECH+	U	U
eBook reading—Action (Gong & Levy, 2009)	I	12–15 minute sessions, 6 sessions in 4 weeks	Less than 2	✓		✓				TECH+	U	U
eBook reading—Bouncing ball (Gong & Levy, 2009)	I	10–15 minute sessions, 6 sessions in 4 weeks	Less than 2	✓		✓				TECH+	U	U
eBook reading—Violation (Gong & Levy, 2009)	I	11–15 minute sessions, 6 sessions in 4 weeks	Less than 2	✓		✓				TECH+	U	U
Electronic picturebooks (Allison, 2016)	I	12 weeks	25–50	✓		✓				TECH	✓	
Funnix Beginning Reading computer program (Stockard, 2009)	I	30 minute sessions, 5 sessions per week for 32 weeks	More than 60	✓	✓	✓	✓	✓	✓	TECH+	✓	✓
Imagine Learning (Trotti et al., 2017)	I	15 minute sessions, 5 sessions per week for 16 weeks	2–25	✓	✓					TECH	U	U
Story Friends (Kelley et al., 2015)	I	8–10 minute sessions, 3–4 sessions per week for 12 weeks	2–25	✓						TECH+	U	U
Story Friends with embedded lessons (Goldstein et al., 2016)	I	9–12 minute sessions, 1–3 sessions per week for 26 weeks	2–25	✓						TECH+	U	U
Waterford Early Learning (Trotti et al., 2017)	I	15 minute sessions, 5 sessions per week for 16 weeks	2–25	✓	✓					TECH	U	U

Intervention name	Grouping	Intensity and duration	Time Total instruction (hours)	Instructional domain					Implementation						
				L	PA	PK	D	W	Lesson plan	Interventionist	Prior PD provided	Ongoing support			
<b>Single-case design (<i>n</i> = 14)</b>															
<i>Instructional practice</i>															
Book reading and Enhanced Milieu Teaching play (McLeod et al., 2017)	I	20 minute sessions, 13–21 sessions	2–25	✓					R	U	U				
Book reading and play (Stanton-Chapman, 2004)	S	30 minute sessions, 11 sessions	2–25	✓					✓	R	✓				
Book reading and play sessions (Stanton-Chapman et al., 2012)	S	20–25 minute sessions, 15 sessions	2–25	✓					R	U	U				
Grammatically complete and incomplete prompts to imitate (Bredin-Oja, 2012)	I	25 minute sessions, 7 sessions	2–25	✓					R	U	U				
iPad instruction of target verb (Dennis et al., 2016)	S, I	10 minute sessions, 7 sessions in 7 weeks	2–25	✓					✓	R	✓				
Milieu teaching strategy (Sheldon, 1997)	I	10 minute sessions, 23 sessions in 12 weeks	2–25	✓	✓				R	U	U				
Modified PAth to Literacy (Olszewski, 2015)	I	3–16 sessions	2–25	✓	✓				✓	R	✓	✓			
Multiple skill phonological awareness instruction (Lovelace, 2008)	I	4–11 sessions	2–25	✓					R	✓					
Peer play (Craig-Unkefer & Kaiser, 2002)	S	20 minute sessions, 14 sessions in 9 weeks	2–25	✓					R	U	U				
Phonological awareness instruction (Hsin, 2007)	I	15 minute sessions, 23 sessions in 5 weeks	2–25	✓	✓				✓	R	✓				
Phonological awareness intervention (first sound identification) (Noe et al., 2014)	S	15–20 minute sessions, 24 sessions in 8 weeks	2–25	✓	✓				✓	R	✓				
Phonological awareness intervention (Kruse, 2013)	S	10–15 minute sessions, 26–36 sessions in 12.5 weeks	2–25	✓	✓				✓	R	✓				
Play Sessions (Craig-Unkefer, 1999)	S	18 minute sessions, 17 sessions	2–25	✓					R	✓					

Intervention name	Grouping	Intensity and duration	Total instruction (hours)	Instructional domain					Implementation			
				L	PA	PK	D	W	Lesson plan	Interventionist	Prior PD provided	Ongoing support
<i>Technology program</i>												
Video self-modeling (Whitlow, 2003)	I	4 sessions	Less than 2	V					TECH+	U	U	

Grouping: I is one on one, L is large group, S is small group, W is whole class.

Instructional domain: D is decoding, L is language, PA is phonological awareness, PK is print knowledge, W is early writing.

Interventionist: O is speech-language pathologist, paraprofessional, volunteer, or parent; R is researcher; T is teacher; TECH is technology; TECH+ is technology with adult supervision.

Prior professional development (PD) provided: U is unknown.

Ongoing support: U is unknown.

Source: Authors' compilation.

## Appendix E. Research basis for the 109 high-quality impact studies

**Table E1. Research basis for the 95 group design studies that the study team determined met the evidence standards**

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Allison, J. C. (2016). <i>Electronic picture books: Do they support the construction of print knowledge in young emergent literacy learners?</i> (Order No. 10193515) [Doctoral dissertation, Temple University]. ProQuest Dissertations & Theses database.	Cluster RCT	Electronic picturebooks	Business as usual	67 students in 4 childcare centers	PA	S	GRTR: Phonological awareness	0.07	
					PK	S	GRTR: Print knowledge		-0.26
Assel, M. A., Landry, S. H., Swank, P. R., & Gunnewig, S. (2007). An evaluation of curriculum, setting, and mentoring on the performance of children enrolled in pre-kindergarten. <i>Reading and Writing</i> , 20(5), 463–494. <a href="https://eric.ed.gov/?id=EJ774756">https://eric.ed.gov/?id=EJ774756</a> .	Cluster RCT	Let's Begin with the Letter People with mentoring	Business as usual	261 students in 13 schools	L	S	Preschool Language Scale-IV: Auditory comprehension	0.02	
				259 students in 13 schools	D	S	Expressive Vocabulary Test: Expressive vocabulary and word retrieval	-0.10	
		Doors to Discovery without mentoring	Business as usual	270 students in 13 schools	D	S	WJ: Letter-word identification	0.34	*
							WJ: Letter-word identification	-0.08	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Bailey, L. L., Repper, K. K., Piasta, S. B., & Murphy, S. P. (2009). Emergent literacy intervention for prekindergarteners at risk for reading failure. <i>Journal of Learning Disabilities</i> , 42(4), 336–355. <a href="https://eric.ed.gov/?id=EJ843696">https://eric.ed.gov/?id=EJ843696</a> .	Cluster RCT	Emergent literacy intervention	Business as usual	About 185 students in 38 private preschool and childcare centers in year 1; about 252 students in 72 private preschool and childcare centers in year 2; about 370 students in 102 private preschool and childcare centers in year 3	L PA	S	Year 1 GGG: Picture naming Year 2 TOPEL: Vocabulary Year 1 GGG: Alliteration Year 1 GGG: Rhyming Year 2 TOPEL: Elision Year 2 TOPEL: Blending Year 3 TOPEL: Elision Year 3 TOPEL: Blending Year 3 Assessment of Literacy and Language: Rhyme knowledge	0.47 -0.03 0.45 0.38 -0.02 0.23 0.09 0.35 0.24	**
					PK	S	Year 2 TOPEL: Print knowledge Year 3 TOPEL: Print knowledge	0.48 0.12	**
					G	S	Year 1 GRTR Year 2 GRTR Year 3 GRTR	0.38 0.28 0.22	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Bierman, K. L., Domitrovich, C. E., Nix, R. L., Gest, S. D., Welsh, J. A., Greenberg, M. T., Blair, C., Nelson, K. E., & Gill, S. (2008). Promoting academic and social-emotional school readiness: The head start REDI program. <i>Child Development</i> , 79(6), 1802–1817. <a href="https://eric.ed.gov/?id=EJ818718">https://eric.ed.gov/?id=EJ818718</a> .	Cluster RCT	Head Start REDI	Business as usual	336 students in 44 Head Start classrooms	L	S	EOWPVT	0.18	
							TOLD: Grammatical understanding	0.28	*
							TOLD: Sentence imitation	-0.13	
					PA	S	TOPEL: Blending	0.37	***
							TOPEL: Elision	0.28	*
					PK	S	TOPEL: Print knowledge	0.11	
Blewitt, P., Rump, K. M., Shealy, S. E., & Cook, S. A. (2009). Shared book reading: When and how questions affect young children's word learning. <i>Journal of Educational Psychology</i> , 101(2), 294. <a href="https://eric.ed.gov/?id=EJ835037">https://eric.ed.gov/?id=EJ835037</a> .	RCT	Storybook reading with scaffolding-like questions (study 2)	Storybook reading with scaffolding-like questions	33 students in 4 preschools	L	RD	New Word Comprehension Test	0.11	
							New Word Definition Test	0.76	
Bochna, C. R. (2006). <i>The impact of instruction in text structure on listening comprehension in preschool age students</i> (UMI No. 3378045) [Doctoral dissertation, The Pennsylvania State University]. ProQuest Dissertations & Theses database.	RCT	Explicit expository book reading	Storybook reading	36 students in 3 Head Start centers	L	RD	Main idea free recall	-0.02	
							Main idea prompted recall	0.22	
							Topic prompted recall	1.35	***

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Bowyer-Crane, C., Snowling, M. J., Duff, F. J., Fieldsend, E., Carroll, J. M., Miles, J., Gotz, C., & Hulme, C. (2008). Improving early language and literacy skills: Differential effects of an oral language versus a phonology with reading intervention. <i>Journal of Child Psychology and Psychiatry, 49</i> (4), 422–432. <a href="https://eric.ed.gov/?id=EJ812879">https://eric.ed.gov/?id=EJ812879</a> .	RCT	Phonology with Reading (P + R) program	Oral language program	142 students in 19 schools	PA	RD	Sound isolation task—initial phoneme component	0.10	
							TOPA: Phoneme segmentation, blending, deletion	0.82	***
					PK	RD	Phonological abilities test	0.22	
							Letter identification	0.42	*
					D	RD	Prose reading accuracy	0.44	**
							Early Word Recognition Test	0.43	*
					W	RD	Spelling items correct	0.50	**
							Spelling percent consonants correct	0.25	
			Oral language program	142 students in 19 schools	L	RD	Listening comprehension	0.11	
							APT: Grammar	0.38	
					S	RD	The Bus Story: Average sentence length	0.30	
							The Bus Story: Narrative skill	0.24	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Boyer, N. E. (2010). <i>Phonemic awareness instruction: Effects of letter manipulation and articulation training on learning to read and spell</i> (UMI No. 3426368) [Doctoral dissertation, The City University of New York]. ProQuest Dissertations & Theses database.	RCT	Letter manipulation plus articulation	Letter manipulation only	40 students in 6 classrooms in 2 private preschools	PA	RD	Phoneme segmentation—words	0.70	
							Phoneme segmentation—sounds	0.54	
					PK	RD	Letter-sound task	0.32	
					D	RD	Nonword reading task	0.84	*
					W	RD	Developmental spelling task—nonwords	0.81	*
							Developmental spelling task—sounds	0.85	*
Brigman, G., Lane, D., Switzer, D., Lane, D., & Lawrence, R. (1999). Teaching children school success skills. <i>The Journal of Educational Research</i> , 92(6), 323–329. <a href="http://doi.org/10.1080/00220679909597615">http://doi.org/10.1080/00220679909597615</a> .	Cluster RCT	Ready to Learn	Business as usual	145 students in 10 classrooms in 3 preschool centers	L	S	Metropolitan Readiness Test: Combined auditory memory and school language and listening subtests	0.07	
							Metropolitan Readiness Test: Story structure	0.70	
Cabell, S. Q., Justice, L. M., Piasta, S. B., Curenton, S. M., Wiggins, A., Turnbull, K. P., & Petscher, Y. (2011). The impact of teacher responsibility education on preschoolers' language and literacy skills. <i>American Journal of Speech-Language Pathology</i> , 20(4), 315–330. <a href="https://eric.ed.gov/?id=EJ946267">https://eric.ed.gov/?id=EJ946267</a> .	Cluster RCT	Professional development on responsibility education	Business as usual	235 students in 49 classrooms in 38 Head Start centers and public elementary schools	L	S	PPVT-III	0.12	
					PK	S	CELF Preschool-2: Expressive vocabulary	0.03	
							PWPA	0.40	**

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Callcott, D., Hammond, L., & Hill, S. (2015). The synergistic effect of teaching a combined explicit movement and phonological awareness program to preschool aged students. <i>Early Childhood Education Journal</i> , 43(3), 201–211. <a href="https://eric.ed.gov/?id=EJ1055702">https://eric.ed.gov/?id=EJ1055702</a> .	Cluster QED	Let's Decode plus Moving on with Literacy	Business as usual	163 students in 16 classrooms in 8 primary schools	PA W	S	TOPA WRAT-Revised: Spelling	0.48 0.58	
		Let's Decode	Business as usual	146 students in 16 classrooms in 8 primary schools	PA W	S	TOPA WRAT-Revised: Spelling	0.44 0.30	
Callihan, K. D. (2003). <i>Emergent literacy activities in preschool years: The effects of explicit instruction on rhyming and narrative development</i> (UMI No. 1418524) [Master's thesis, Marshall University]. ProQuest Dissertations & Theses database.	RCT	Storybook reading focusing on narrative	Storybook reading focusing on rhyme	4 students in 1 daycare center	L	RD	Lexical richness Percentage of completed cohesive ties used	0.81 -1.03	
		Read aloud program with fiction and nonfiction books	Read Aloud program with fiction books	30 students in 1 preschool	L PA	S	Kaufman Survey of Early Academic and Language Skills PALS-PreK	-0.53 -0.05	
Christie, J., Roskos, K., Vukelich, C., & Han, M. (2003). The effects of a well-designed literacy program on young children's language and literacy development. In F. Lamb-Parker, J. Hagan, R. Robinson, & H. Rhee (Eds.), <i>The first eight years, Pathways to the future: Implications for research, policy, and practice, Head Start's Sixth National Research Conference</i> (pp. 453–454). Columbia University, Mailman School of Public Health. <a href="https://eric.ed.gov/?id=ED474955">https://eric.ed.gov/?id=ED474955</a> .	Cluster QED	Doors to Discovery	Business as usual	53 students in 5 classrooms in 5 preschools	L	S	PPVT	0.45	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Ciancio, D. J. (2004). <i>Early intervention: Effects of behavioral regulation on learning and emerging self-competence</i> (UMI No. 3116629) [Doctoral dissertation, University of Notre Dame]. ProQuest Dissertations & Theses database.	RCT	Enriched literacy intervention	Storybook reading	106 students in 7 Head Start classrooms	PA	RD	Rhyme matching	1.71	***
					PK	RD	Rhyme detection	1.19	***
							Letter name knowledge	1.20	***
							Letter sound knowledge	-0.45	*
Clouser, K. F. (2001). <i>The effects of setting storybooks' texts to music on story comprehension, vocabulary, and attitude towards reading in preschool children</i> [Unpublished master's thesis, Florida State University].	QED	Music therapy activities with singing of books	Music therapy activities with reading of books	50 students in 4 preschools	L	S	PPVT-Revised	0.22	
Davidson, M. R., Fields, M. K., & Yang, J. (2009). A randomized trial study of a preschool literacy curriculum: The importance of implementation. <i>Journal of Research on Educational Effectiveness</i> , 2(3), 177–208. <a href="https://eric.ed.gov/?id=EJ866975">https://eric.ed.gov/?id=EJ866975</a> .	Cluster RCT	Ready, Set, Leap!	Business as usual	254 students in 17 public elementary schools	L	S	PPVT-III	0.01	
					PA	S	CTOPP: Blending	0.18	
							DIBELS: Initial sound fluency	0.16	
					PK	S	WJ-III: Rhyming	0.09	
							DIBELS: Letter naming fluency	-0.06	
					D	S	WJ: Letter-word identification	0.10	
Desmond, S. K. (2008). <i>The effects of rhyme on phonological sensitivities</i> (UMI No. 3326012) [Doctoral dissertation, Seattle Pacific University]. ProQuest Dissertations & Theses database.	RCT	Rhyme training	Math manipulative Intervention	About 60 students in 5 public preschool classrooms	PA	S	PIPA: Sound segmentation	0.28	
							PIPA: Sound isolation	-0.22	
							PIPA: Alliteration awareness	0.13	
							PIPA: Rhyme awareness	0.45	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Esler, A. N. (2001). <i>Children at the venter: Promoting child development through evidence-based practice</i> (UMI No. 9997644) [Master's thesis, University of Minnesota]. ProQuest Dissertations & Theses database.	Cluster RCT	Enhancing language and social skills using evidence-based practices	Business as usual	46 students in 7 classrooms in 6 childcare centers	L	S	Test of Early Language Development-3	0.75	
Fischel, J. E., Bracken, S. S., Fuchs-Eisenberg, A., Spira, E. G., Katz, S., & Shaller, G. (2007). Evaluation of curricular approaches to enhance preschool early literacy skills. <i>Journal of Literacy Research</i> , 39(4), 471–501. <a href="http://doi.org/10.1080/10862960701675333">http://doi.org/10.1080/10862960701675333</a> .	Cluster RCT	Let's Begin with the Letter People	Business as usual	335 students in 23 Head Start classrooms	L D	S S	PPVT-III WJ-Revised: Letter-word Identification	0.20 0.30	
				228 students in 23 Head Start classrooms	W	S	WJ-Revised: Dictation	0.37	
		Waterford Early Reading	Business as usual	322 students in 23 Head Start classrooms	L D	S S	PPVT-III WJ-Revised: Letter-word Identification	0.06 0.12	
				277 students in 23 Head Start classrooms	W	S	WJ-Revised: Dictation	0.04	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Fricke, S., Bowyer-Crane, C., Haley, A. J., Hulme, C., & Snowling, M. J. (2013). Efficacy of language intervention in the early years. <i>Journal of Child Psychology and Psychiatry</i> , 54(3), 280–290. <a href="https://eric.ed.gov/?id=EJ1012716">https://eric.ed.gov/?id=EJ1012716</a> .	RCT	Nuffield Early Language Intervention—30 week	Business as usual	166 students in 15 nursery schools	L	RD	Listening comprehension	0.27	
							Narrative mean length utterances	0.24	
							Narrative number of words	0.48	**
							Narrative number of different words	0.41	**
					S		CELF Preschool-2 Expressive vocabulary	0.44	**
							CELF Preschool-2 Sentence structure	0.13	
							APT: Information	0.44	**
							APT: Grammar	0.88	***
					PA	RD	Alliteration matching	0.51	**
					S		YARC: Sound isolation	0.16	
					PK	RD	Letter sounds	0.31	*
					D	S	YARC: Early word reading	0.16	
					W	RD	Spelling	0.22	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Fricke, S., Burgoyne, K., Bowyer-Crane, C., Kyriacou, M., Zosimidou, A., Maxwell, L., Lervåg, A., Snowling, M. J., & Hulme, C. (2017). The efficacy of early language intervention in mainstream school settings: A randomized controlled trial. <i>Journal of Child Psychology and Psychiatry</i> , 58(10), 1141–1151. <a href="https://eric.ed.gov/?id=EJ1154623">https://eric.ed.gov/?id=EJ1154623</a> .	RCT	Nuffield Early Language Intervention—30 week	Business as usual	234 students in 34 nursery schools	L	RD	Listening comprehension	0.26	*
						S	CELF Preschool-2: Expressive vocabulary	0.23	
							CELF Preschool-2: Sentence structure	0.02	
							BPVS	0.19	
							APT: Information	0.05	
							APT: Grammar	0.19	
					PK	S	YARC: Letter-sound knowledge	0.19	
					D	S	YARC: Early word reading	-0.03	
		Nuffield Early Language Intervention—20 week	Business as usual	242 students in 30 nursery schools	L	RD	Listening comprehension	0.10	
						S	CELF: Expressive vocabulary	0.21	
							CELF: Sentence structure	0.20	
							BPVS	0.09	
							APT: Information	0.23	
							APT: Grammar	0.21	
					PK	S	YARC: Letter-sound knowledge	-0.07	
					D	S	YARC: Early word reading	0.15	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Gillis, M. B. (1998). <i>Evidence for the language basis of reading disabilities in preschool children</i> (UMI No. 9907066) [Doctoral dissertation, University of Louisville]. ProQuest Dissertations & Theses database.	RCT	Print awareness curriculum plus phonological awareness intervention	Print awareness curriculum	37 students in 1 public preschool	PA	RD	Rubin's test of rhyming awareness	0.55	
						S	Test of Awareness of Language Segments	0.61	
					PK	RD	Clay's (1975) Stones: The Concepts About Print Test	0.29	
Goldstein, H., Kelley, E., Greenwood, C., McCune, L., Carta, J., Atwater, J., Guerrero, G., McCarthy, T., Schneider, N., & Spencer, T. (2016). Embedded instruction improves vocabulary learning during automated storybook reading among high-risk preschoolers. <i>Journal of Speech, Language, and Hearing Research</i> , 59(3), 484–500. <a href="https://eric.ed.gov/?id=ED577031">https://eric.ed.gov/?id=ED577031</a> .	Cluster RCT	Story Friends with embedded lessons	Story Friends without embedded lessons	154 students in 32 public school prekindergarten classrooms	L	S	CELF Preschool	0.12	
Goldstein, H., Olszewski, A., Haring, C., Greenwood, C. R., McCune, L., Carta, J., Atwater, J., Guerrero, G., Schneider, N., McCarthy, T., & Kelley, E. S. (2017). Efficacy of a supplemental phonemic awareness curriculum to instruct preschoolers with delays in early literacy development. <i>Journal of Speech, Language, and Hearing Research</i> , 60(1), 89–103. <a href="https://eric.ed.gov/?id=ED577032">https://eric.ed.gov/?id=ED577032</a> .	Cluster RCT	PAth to Literacy	Story Friends	104 students in 39 public prekindergarten classrooms and childcare centers in 3 states	PA	S	CELF Preschool-2	-0.20	
						S	DIBELS: First sound fluency	1.13	***
						S	IGDI: First sounds	0.05	
					PK	S	TOPEL: Phonological awareness	-0.04	
						S	IGDI: Sound identification	0.23	
						S	TOPEL: Print knowledge	0.02	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Gong, Z., & Levy, B. A. (2009). Four year old children's acquisition of print knowledge during electronic storybook reading. <i>Reading and Writing</i> , 22(8), 889–905. <a href="https://eric.ed.gov/?id=EJ855305">https://eric.ed.gov/?id=EJ855305</a> .		eBook reading—Action	eBook reading	48 students in 12 public schools	PK	RD	WRAT-3: Letter naming items of the reading subtest	0.37	
		eBook reading—Bouncing ball	eBook reading	48 students in 12 public schools	PK	RD	WRAT-3 Letter naming items of the reading subtest	0.24	
		eBook reading—Violation	eBook reading	48 students in 12 public schools	PK	RD	WRAT-3 Letter naming items of the reading subtest	0.07	
Guidry, L. O. (2003). <i>A phonological awareness intervention for at -risk preschoolers: The effects of supplemental, intensive, small-group instruction</i> (UMI No. 3098070) [Doctoral dissertation, Louisiana State University and Agricultural and Mechanical College]. ProQuest Dissertations & Theses database.	RCT	Whole-class phonological awareness training with supplemental small-group instruction	Whole-class phonological awareness training only	48 students in 4 classrooms in 1 public school	PA	S	Test of Awareness of Language Segments	-0.07	
							DIBELS: Initial sound fluency	0.21	
Haley, A., Hulme, C., Bowyer-Crane, C., Snowling, M. J., & Fricke, S. (2017). Oral language skills intervention in pre-school—a cautionary tale. <i>International Journal of Language &amp; Communication Disorders</i> , 52(1), 71–79. <a href="http://doi.org/10.1111/1460-6984.12257">http://doi.org/10.1111/1460-6984.12257</a> .	RCT	Oral language intervention (L4R)	Business as usual	100 students in 13 nursery schools	L	S	CELF Preschool-2: Expressive vocabulary	-0.11	
							CELF Preschool-2: Sentence structure	-0.01	
							APT: Information	0.17	
							APT: Grammar	0.03	
							YARC: Listening comprehension	0.36	
							PA	RD	Alliteration matching 0.07
							PK	S	YARC: Letter-sound knowledge 0.05
							D	S	YARC: Early word reading 0.28

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Harris, S. (2010). <i>Early intervention for poverty-stricken children: A study of preschoolers receiving Jumpstart</i> (UMI No. 3528245) [Doctoral dissertation, Illinois State University]. ProQuest Dissertations & Theses database.	RCT	Jumpstart	Business as usual	66 students in 3 preschools and childcare programs	L PA PK G	S S S S	TERA: Meaning IGDI: Picture naming IGDI: Alliteration IGDI: Rhyming TERA: Alphabet TERA: Conventions Bracken School Readiness Assessment	ne <sup>+</sup> ne <sup>+</sup> ne <sup>+</sup> ne <sup>+</sup> ne <sup>+</sup> ne <sup>+</sup> ne <sup>+</sup>	* * * ** ** ** **
Hong, S. Y., & Diamond, K. E. (2012). Two approaches to teaching young children science concepts, vocabulary, and scientific problem-solving skills. <i>Early Childhood Research Quarterly</i> , 27(2), 295–305. <a href="https://eric.ed.gov/?id=EJ958051">https://eric.ed.gov/?id=EJ958051</a> .	Cluster QED	Responsive teaching and explicit instruction	Responsive teaching	72 students in 18 classrooms	L	RD	Concepts and vocabulary	1.01	***
Justice, L. M. (2000). An experimental evaluation of an intervention to stimulate written language awareness in preschool children from low-income households (UMI No. 9980417) [Doctoral dissertation, Ohio University]. ProQuest Dissertations and Theses database.	RCT	Print-focused storybook reading	Picture-focused storybook reading	30 students in 4 classrooms in 1 Head Start center	PK	RD	Print concepts Print recognition Words in print Letter orientation and discrimination Alphabet knowledge Literacy terms	0.33 1.57 1.30 0.26 0.48 0.47	*** **
Justice, L. M., Chow, S. M., Capellini, C., Flanigan, K., & Colton, S. (2003). Emergent literacy intervention for vulnerable preschoolers. <i>American Journal of Speech-Language Pathology</i> , 12(3), 320–332. <a href="http://doi.org/10.1044/1058-0360(2003/078)">http://doi.org/10.1044/1058-0360(2003/078)</a> .	RCT	Explicit emergent literacy intervention	Shared storybook reading + story retelling	18 students in 1 preschool center	PA PK RD W	S S S S	PAT: Phonological segmentation PAT: Rhyme production items from rhyming subtest Alphabet knowledge PWPA: Print concepts PALS-PreK: Name writing	ne <sup>+</sup> ne <sup>+</sup> ne <sup>+</sup> ne <sup>+</sup> ne <sup>+</sup>	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Justice, L. M., McGinty, A. S., Piasta, S. B., Kaderavek, J. N., & Fan, X. (2010). Print-focused read-alouds in preschool classrooms: Intervention effectiveness and moderators of child outcomes. <i>Language, Speech, and Hearing Services in Schools</i> , 41(4), 504–520. <a href="https://eric.ed.gov/?id=EJ909127">https://eric.ed.gov/?id=EJ909127</a> .	Cluster RCT	Print-focused storybook read aloud with high-dose print referencing	Print-focused storybook read aloud	278 students in 58 classrooms	L G	S RD	CELF Preschool-2 Standardized factor score from PALS-PreK: Upper-case alphabet recognition, PALS-PreK: Name writing, and PWPA	0.08 0.23	
Kelley, E. S., Goldstein, H., Spencer, T. D., & Sherman, A. (2015). Effects of automated Tier 2 storybook intervention on vocabulary and comprehension learning in preschool children with limited oral language skills. <i>Early Childhood Research Quarterly</i> , 31(1), 47–61. <a href="https://eric.ed.gov/?id=ED577028">https://eric.ed.gov/?id=ED577028</a> .	RCT	Story Friends	Business as usual	18 students in 3 prekindergarten classrooms in 3 public elementary schools	L S	RD	Assessment of story comprehension PPVT-IV CELF Preschool: Core language composite	0.72 0.21 0.22	
Kelley, E. S., & Kinney, K. (2017). Word learning and story comprehension from digital storybooks: Does interaction make a difference? <i>Journal of Educational Computing Research</i> , 55(3), 410–428. <a href="https://eric.ed.gov/?id=EJ1141523">https://eric.ed.gov/?id=EJ1141523</a> .	RCT	Digital storybook with interactive features	Digital storybook without interactive features	30 students in 2 preschool centers	L	RD	Definitional word knowledge Decontextual word knowledge Receptive word knowledge	0.15 0.21 0.01	
Lane, C., Prokop, M. J. S., Johnson, E., B., Podhajski, & Nathan, J. (2014). Promoting early literacy through the professional development of preschool teachers. <i>Early Years</i> , 34(1), 67–80. <a href="https://eric.ed.gov/?id=EJ1024475">https://eric.ed.gov/?id=EJ1024475</a> .	Cluster QED	Building Blocks for Literacy with distance mentoring	Business as usual	133 students in 18 Head Start classes	G	S	GRTR	1.05	***

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Langan, R. (2010). <i>Reducing the synonym effect: The impact of increased engagement on children's word learning during book reading</i> (UMI No. 1483531) [Master's thesis, Villanova University]. ProQuest Dissertations and Theses database.	RCT	Storybook reading with ostensive questions and feedback	Storybook reading with ostensive comments	26 students in several preschools	L	RD	Comprehension synonyms	1.99	***
		Storybook reading with scaffolded questions and feedback	Storybook reading with ostensive comments	26 students in several preschools	L	RD	Comprehension nonsynonyms	0.43	
							Definition synonyms	0.72	
							Definition nonsynonyms	0.96	*
Lee, W., & Pring, T. (2016). Supporting language in schools: Evaluating an intervention for children with delayed language in the early school years. <i>Child Language Teaching and Therapy</i> , 32(2), 135–146. <a href="https://eric.ed.gov/?id=EJ1103212">https://eric.ed.gov/?id=EJ1103212</a> .	Cluster RCT	Talk Boost	Business as usual	54 students in 18 schools	L	S	APT: Information	0.97	**
							APT: Grammar	0.16	
							The Bus Story	0.46	
Leung, C. B. (2008). Preschoolers' acquisition of scientific vocabulary through repeated read-aloud events, retellings, and hands-on science activities. <i>Reading Psychology</i> , 29(2), 165–193. <a href="https://eric.ed.gov/?id=EJ790593">https://eric.ed.gov/?id=EJ790593</a> .	RCT	Storybook reading + retelling	Storybook reading	32 students in 1 YWCA child development center	L	RD	Free recall target word test	0.39	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Lima, O. K. A. (2008). <i>Proximal processes in preschoolers' word learning from classroom storybook sessions: Effects of teacher elaboration and child attention</i> (UMI No. 3362854) [Doctoral dissertation, University of Virginia]. ProQuest Dissertations and Theses database	Cluster RCT	Storybook reading with elaboration	Storybook reading	106 students in 26 classrooms in private preschools	L	RD	Receptive target word	ne <sup>u</sup>	
							Receptive incidental	ne <sup>u</sup>	
							Receptive control	ne <sup>u</sup>	
							Expressive target	ne <sup>u</sup>	
							Expressive incidental	ne <sup>u</sup>	
							Expressive control	ne <sup>u</sup>	
Lonigan, C. J., Anthony, J. L., Bloomfield, B. G., Dyer, S. M., & Samwel, C. S. (1999). Effects of two shared-reading interventions on emergent literacy skills of at-risk preschoolers. <i>Journal of Early Intervention</i> , 22(4), 306–322. <a href="http://doi.org/10.1177/105381519902200406">http://doi.org/10.1177/105381519902200406</a> .	RCT	Dialogic reading	Storybook reading	54 students in 5 childcare centers	L	S	PPVT-Revised	0.39	
							EOWPVT-Revised	-0.02	
							Illinois Test of Psycholinguistic Abilities: Verbal expression	0.17	
							WJ: Listening comprehension	-0.13	
Lonigan, C. J., Driscoll, K., Phillips, B. M., Cantor, B. G., Anthony, J. L., & Goldstein, H. (2003). A computer-assisted instruction phonological sensitivity program for preschool children at-risk for reading problems. <i>Journal of Early Intervention</i> , 25(4), 248–262. <a href="https://eric.ed.gov/?id=EJ674627">https://eric.ed.gov/?id=EJ674627</a> .	RCT	Computer-assisted instruction	Business as usual	41 students in 1 Head Start center	PA	RD	Rhyme oddity	0.77	*
							Rhyme matching	0.79	
							Word blending	0.33	
							Syllable/phoneme blending	0.01	
							Multiple-choice blending	0.26	
							Word elision	0.75	*
							Syllable/phoneme elision	0.95	**
							Multiple-choice elision	0.31	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Lonigan, C. J., Farver, J. M., Phillips, B. M., & Clancy-Menchetti, J. (2011). Promoting the development of preschool children's emergent literacy skills: A randomized evaluation of a literacy-focused curriculum and two professional development models. <i>Reading and Writing</i> , 24(3), 305–337. <a href="https://eric.ed.gov/?id=EJ915825">https://eric.ed.gov/?id=EJ915825</a> .	Cluster RCT	Literacy Express Preschool Curriculum plus workshop and in-class mentoring	Business as usual	About 508 students in 33 Head Start centers and Title I schools	L PA	S S	Preschool Language Scale-IV Preschool CTOPP: Elision Preschool CTOPP: Blending	0.32 0.34 0.11	*
					PK	S	Preschool CTOPP: Print knowledge	0.44	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Lonigan, C. J., Phillips, B. M., Clancy, J. L., Landry, S. H., Swank, P. R., Assel, M., Taylor, H. B., Klein, A., Starkey, P., Domitrovich, C. E., Eisenberg, N., Villiers, J., Villiers, P., & Barnes, M. (2015). Impacts of a comprehensive school readiness curriculum for preschool children at risk for educational difficulties. <i>Child Development</i> , 86(6), 1773–1793. <a href="https://eric.ed.gov/?id=EJ1079878">https://eric.ed.gov/?id=EJ1079878</a> .	Cluster RCT	Literacy Express Preschool Curriculum + Pre-K Mathematics Curriculum + PATHS Explicit	Business as usual	About 445 students in 60 preschool centers	L	S	DELV: Language Variation Status screener A	-0.07	
		DELV: Language Variation Status screener B	0.21						
		EOWPVT	0.15						
		DELV: Diagnostic Risk Status screener	0.14						
		PA	S	TOPEL: Elision	0.26				
			S	TOPEL: Blending	0.26				
		PK	S	TOPEL: Print knowledge	0.19				
			S	DELV: Language Variation Status screener A	-0.05				
			S	DELV: Language Variation Status screener B	0.19				
			S	EOWPVT	0.11				
			S	DELV: Diagnostic Risk Status screener	0.24				
			S	TOPEL: Elision	0.21				
			S	TOPEL: Blending	0.31				
			S	TOPEL: Print knowledge	0.16				

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Lonigan, C. J., & Phillips, B. M. (2016). Response to instruction in preschool: Results of two randomized studies with children at significant risk of reading difficulties. <i>Journal of Educational Psychology, 108</i> (1), 114–129. <a href="https://eric.ed.gov/?id=EJ1086979">https://eric.ed.gov/?id=EJ1086979</a> .	RCT	Tier 2: Language- and code-focused intervention for children who qualified for language-focused or code- and language-focused intervention (study 1)	Business as usual	60 students in 12 Title I preschools	L	RD	CLIP: Language	0.06	
						S	Preschool CTOPP: Definitional vocabulary	-0.25	
						Preschool CTOPP: Receptive vocabulary	-0.26		
						CELF Preschool: Receptive language	0.29		
						CELF Preschool: Expressive language	0.27		
		Tier 2: Code- and language-focused intervention for children who qualified for code-focused or code- and language-focused intervention (study 1)	Business as usual	81 students in 12 Title I preschools	PA	S	Preschool CTOPP: Elision	0.15	
							Preschool CTOPP: Blending	-0.25	
						PK	RD	CLIP: Letter names	0.25
								CLIP: Letter sounds	0.19
							S	Preschool CTOPP: Print knowledge	0.10
						G	S	TERA	-0.06

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
		Tier 2: Intensive language- and code-focused intervention for children who qualified for language-focused or code- and language-focused intervention (study 2)	Business as usual	132 students in 21 Title I prekindergarten programs	L	S	Preschool CTOPP: Definitional vocabulary	-0.04	
							Preschool CTOPP: Receptive vocabulary	0.21	
							CELF Preschool: Receptive language	0.07	
							CELF Preschool: Expressive language	0.00	
		Tier 2: Intensive code- and language-focused intervention for children who qualified for code-focused or language- and code-focused intervention (study 2)	Business as usual	148 students in 21 Title I prekindergarten programs	PA	S	Preschool: CTOPP: Elision	0.45	**
					PK	RD	Preschool CTOPP: Blending	0.13	
							CLIP: Letter names	0.14	
							CLIP: Letter sounds	0.18	
						S	Pre-CTOPP: Print knowledge	0.20	
					G	S	TERA-3	-0.10	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Lonigan, C. J., Purpura, D. J., Wilson, S. B., Walker, P. M., & Clancy-Menchetti, J. (2013). Evaluating the components of an emergent literacy intervention for preschool children at risk for reading difficulties. <i>Journal of Experimental Child Psychology</i> , 114(1), 111–130. <a href="https://eric.ed.gov/?id=EJ1006636">https://eric.ed.gov/?id=EJ1006636</a> .	RCT	Dialogic reading and phonological awareness intervention	Business as usual	129 students in 13 Head Start centers and Title I preschools	L PA PK	RD	Language composite Phonological awareness composite Print knowledge composite	0.34 0.31 0.00	
		Dialogic reading, phonological awareness, and letter knowledge	Business as usual	139 students in 13 Head Start centers and Title I preschool	L PA PK	RD	Language composite Phonological awareness composite Print knowledge composite	0.13 0.32 0.19	
		Storybook reading, phonological awareness, and letter knowledge	Business as usual	136 students in 13 Head Start centers and Title I preschools	L PA PK	RD	Language composite Phonological awareness composite Print knowledge composite	0.00 0.29 0.03	
		Dialogic Reading and letter knowledge	Business as usual	136 students in 13 Head Start centers and Title I preschools	L PA PK	RD	Language composite Phonological awareness composite Print knowledge composite	0.20 0.13 0.14	
Macaruso, P., & Rodman, A. (2011). Efficacy of computer-assisted instruction for the development of early literacy skills in young children. <i>Reading Psychology</i> , 32(2), 172–196. <a href="https://eric.ed.gov/?id=EJ920179">https://eric.ed.gov/?id=EJ920179</a> .	Cluster RCT	Computer-assisted instruction—Early Reading	Business as usual	38 students in 8 classrooms	PA	S	Group Reading Assessment and Diagnostic Evaluation	0.84	
Majsterek, D. J., Shorr, D. N., & Erion, V. L. (2000). Promoting early literacy through rhyme detection activities during Head Start circle-time. <i>Child Study Journal</i> , 30(3), 143–143. <a href="https://eric.ed.gov/?id=EJ626919">https://eric.ed.gov/?id=EJ626919</a> .	Cluster RCT	Phonological awareness training	Semantic training	40 students in 1 Head Start center	PA	RD	Rhyme detection task	0.57	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Mannes, T. J. (2013). <i>The effect of tier one literacy practices on preschoolers emergent literacy skills</i> (UMI No. 3591959) [Doctoral dissertation, Michigan State University]. ProQuest Dissertations and Theses database.	Cluster QED	Kindergarten Peer Assisted Literacy Strategies and Developing Talkers	Business as usual	94 students in 6 classrooms	D	RD	Sight words	ne <sup>+</sup>	
Massetti, G. M. (2009). Enhancing emergent literacy skills of preschoolers from low-income environments through a classroom-based approach. <i>School Psychology Review</i> , 38(4), 554–569. <a href="https://eric.ed.gov/?id=EJ867982">https://eric.ed.gov/?id=EJ867982</a> .	Cluster RCT	Stony Brook Emergent Literacy Project	Business as usual	116 students in 10 Head Start classrooms	PK	RD	GRTR-Revised: Print awareness	1.75	***
Mincic, M. S. (2009). <i>Dialogic reading with emotion-laden storybooks: Intervention methods to enhance children's emergent literacy and social-emotional skills</i> (UMI No. 3364575) [Doctoral dissertation, George Mason University]. ProQuest Dissertations and Theses database.	Cluster RCT	Dialogic reading with emotion-laden storybooks	Storybook reading	114 students in 15 Head Start classrooms	L	S	TOPEL: Vocabulary	ne <sup>+</sup>	
Nelson, J. R., Sanders, E. A., & Gonzalez, J. (2009). The efficacy of supplemental early literacy instruction by community-based tutors for preschoolers enrolled in Head Start. <i>Journal of Research on Educational Effectiveness</i> , 3(1), 1–25. <a href="https://eric.ed.gov/?id=EJ877224">https://eric.ed.gov/?id=EJ877224</a> .	RCT	Stepping Stones to Literacy	Interactive book reading	88 students in 8 Head Start classrooms	L	S	TOPEL: Definitional vocabulary	0.12	
					PA	S	TOPEL: Phonological awareness	0.20	
					PK	RD	TOPEL Section A: Print knowledge	-0.34	
							TOPEL Sections B and C: Print knowledge	0.37	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Neuman, S. B. (2017). The information book flood: Is additional exposure enough to support early literacy development? <i>The Elementary School Journal</i> , 118(1), 1–27. <a href="https://eric.ed.gov/?id=EJ1162722">https://eric.ed.gov/?id=EJ1162722</a> .	Cluster RCT	Library with additional supports	Business as usual	346 students in 10 schools	L	RD	Concepts of comprehension	0.01	
						S	PPVT	0.29	
							EOWPVT	0.22	
Neuman, S. B., Pinkham, A., & Kaefer, T. (2015). Supporting vocabulary teaching and learning in prekindergarten: The role of educative curriculum materials. <i>Early Education and Development</i> , 26(7), 988–1011. <a href="https://eric.ed.gov/?id=EJ1070888">https://eric.ed.gov/?id=EJ1070888</a> .	Cluster RCT	Educative curriculum material supports	Business as usual	143 students in 10 prekindergarten classrooms in 5 elementary schools	L	RD	Comprehension assessment	0.69	***
						S	PPVT-IV	-0.04	
Neumann, M. M., Hood, M., & Ford, R. M. (2013). Using environmental print to enhance emergent literacy and print motivation. <i>Reading and Writing</i> , 26(5), 771–793. <a href="https://eric.ed.gov/?id=EJ1000168">https://eric.ed.gov/?id=EJ1000168</a> .	RCT	Environmental print	Standard print	48 students in 4 preschools	PK	RD	Letter name knowledge	0.21	
							Letter sound knowledge	0.42	
							Print concepts	0.25	
					W	RD	Letter writing	-0.09	
O'Leary, R. (2017). <i>Do spellings of words and phonemic awareness training facilitate vocabulary learning in preschoolers?</i> (Order No. 10275850) [Doctoral dissertation, The City University of New York]. ProQuest Dissertations and Theses database.	RCT	Phoneme segmentation training using letters to spell	Phoneme segmentation training using shapes to spell	40 students in public, private, and charter schools	W	RD	Invented spelling	0.42	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Palmiter, A. B. W. (2013). <i>The effects of adult scaffolding and child executive functioning skills on vocabulary learning during shared book reading</i> (UMI No. 3585307) [Doctoral dissertation, University of Notre Dame]. ProQuest Dissertations and Theses database.	RCT	Storybook reading with full scaffolded questions and comments	Storybook reading with ostensive repetition	84 students in Head Start classrooms	L	RD	Receptive target word	-0.34	
							Expressive target word	-0.15	
							Definition target word	-0.06	
Patchan, M. M., & Puranik, C. S. (2016). Using tablet computers to teach preschool children to write letters: Exploring the impact of extrinsic and intrinsic feedback. <i>Computers &amp; Education</i> , 102(1), 128–137. <a href="http://doi.org/10.1016/j.compedu.2016.07.007">http://doi.org/10.1016/j.compedu.2016.07.007</a> .	Cluster RCT	Writing using iPad and stylus	Writing using paper and pencil	30 students in 10 classrooms in 6 preschools	PK W	RD	Letter naming	0.44	
		Writing using iPad and finger	Writing using iPad and stylus	30 students in 10 classrooms in 6 preschools	PK W	RD	Letter writing	0.27	
							Letter naming	0.02	
							Letter writing	0.97	*
Penuel, W. R., Bates, L., Gallagher, L. P., Pasnik, S., Llorente, C., Townsend, E., Hupert, N., Dominguez, X., & VanderBorgh, M. (2012). Supplementing literacy instruction with a media-rich intervention: Results of a randomized controlled trial. <i>Early Childhood Research Quarterly</i> , 27(1), 115–127. <a href="https://eric.ed.gov/?id=EJ947504">https://eric.ed.gov/?id=EJ947504</a> .	Cluster RCT	Professional development with media-rich literacy supplement	Professional development with media-rich Science supplement	396 students in 80 classrooms in 2 states	PA PK	S	PALS-PreK: Beginning sound awareness	ne <sup>+</sup>	
							PALS-PreK: Letter name knowledge	ne <sup>+</sup>	***
							PALS-PreK: Letter sounds	ne <sup>+</sup>	***
Phillips, B. M., Tabulda, G., Ingrole, S. A., Burris, P. W., Sedgwick, T. K., & Chen, S. (2016). Literate language intervention with high-need prekindergarten children: A randomized trial. <i>Journal of Speech, Language, and Hearing Research</i> , 59(6), 1409–1420. <a href="https://eric.ed.gov/?id=EJ1124170">https://eric.ed.gov/?id=EJ1124170</a> .	RCT	Literate language intervention	Business as usual	77 students in 7 public Title I prekindergarten programs	L	S	CELF Preschool-2: Sentence structure	0.08	
							Oral and Written Language Scales: Listening comprehension	0.31	
							WJ-III: Picture vocabulary	-0.14	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Piasta, S. B. (2008). <i>Developing emergent literacy skills: The impact of alphabet instruction</i> (UMI No. 3340751) [Doctoral dissertation, Florida State University]. ProQuest Dissertations and Theses database.	RCT	Letter name letter sounds intervention	Business as usual	38 students in 4 private childcare centers	PA	S	TOPEL: Phonological awareness	0.31	
							Letter name production	0.21	
							Letter name recognition	0.13	
							Letter sound production	0.46	
							Letter sound recognition	0.30	
		Letter sounds only intervention	Business as usual	38 students in 4 private childcare centers	PA	S	WJ: Letter-word identification	0.05	
							TOPEL: Phonological awareness	0.02	
							Letter name production	-0.23	
							Letter name recognition	-0.23	
							Letter sound production	0.11	
		D	S	WJ-III: Letter-word identification	PA	S	Letter sound recognition	0.03	
							WJ-III: Letter-word identification	0.03	
Pietrangelo, D. J. (1999). <i>Outcomes of an enhanced literacy curriculum on the emergent literacy skills of Head Start preschoolers</i> (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 9927614).	Cluster RCT	Phonological awareness training plus letter knowledge training	Business as usual	129 students in 10 Head Start classrooms	L	S	PPVT-III	0.16	
							Alliteration	0.38	
							Rhyming	0.38	
							Phoneme blending	0.47	
							Invented spelling	0.18	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Pollard-Durodola, S. D., Gonzalez, J. E., Simmons, D. C., Kwok, O., Taylor, A. B., Davis, M. J., Kim, M., & Simmons, L. (2011). The effects of an intensive shared book-reading intervention for preschool children at risk for vocabulary delay. <i>Exceptional Children</i> , 77(2), 161–183. <a href="https://eric.ed.gov/?id=EJ918899">https://eric.ed.gov/?id=EJ918899</a> .	Cluster RCT	Words of Oral Reading and Language Development	Business as usual	125 students in 6 public preschool classrooms and 12 Head Start classrooms	L	S	PPVT-III EOWPVT	0.09 0.08	
Preschool Curriculum Evaluation Research Consortium. (2008a). Bright Beginnings and Creative Curriculum: Vanderbilt University. In <i>Effects of Preschool Curriculum Programs on School Readiness</i> (NCER No. 2008-2009). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.	Cluster RCT	Bright Beginnings curriculum	Business as usual	About 197 students in 14 preschool classrooms	L	S	PPVT TOLD: Grammatical understanding	0.17 0.15	
					PA	S	Preschool CTOPP: Elision	-0.03	
					D	S	WJ: Letter-word Identification	0.34	
					W	S	WJ: Spelling	0.26	
					G	S	TERA	0.31	
		Creative Curriculum	Business as usual	193 students in 14 preschool classrooms	L	S	TOLD: Grammatical understanding PPVT	0.12 0.28	
					PA	S	Preschool CTOPP: Elision	0.04	
					D	S	WJ: Letter-word identification	0.17	
					W	S	WJ: Spelling	0.20	
					G	S	TERA	0.00	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Preschool Curriculum Evaluation Research Consortium. (2008b). Creative Curriculum: University of North Carolina at Charlotte. In <i>Effects of Preschool Curriculum Programs on School Readiness</i> (NCER No. 2008-2009). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.	Cluster RCT	Creative Curriculum	Business as usual	About 169 students in 18 preschool classrooms	L PA D W G	S S S S S	TOLD: Grammatical understanding PPVT Preschool CTOPP: Elision WJ: Letter-word identification WJ: Spelling TERA	-0.18 0.04 0.06 -0.20 -0.22 -0.19	
Preschool Curriculum Evaluation Research Consortium. (2008c). Creative Curriculum with Ladders to Literacy: University of New Hampshire. In <i>Effects of Preschool Curriculum Programs on School Readiness</i> (NCER No. 2008-2009). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.	Cluster RCT	Creative Curriculum with Ladders to Literacy	Business as usual	105 students in 14 preschool classrooms	PA	S	Preschool CTOPP: Elision	-0.1	
Preschool Curriculum Evaluation Research Consortium. (2008d). Curiosity Corner: Success for All Foundation. In <i>Effects of Preschool Curriculum Programs on School Readiness</i> (NCER No. 2008-2009) (pp. 75–83). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.	Cluster RCT	Curiosity Corner curriculum	Business as usual	About 200 students in 18 preschools	L PA D W G	S S S S S	PPVT TOLD: Grammatical understanding Preschool CTOPP: Elision WJ: Letter-word identification WJ: Spelling TERA	-0.19 -0.24 -0.19 -0.18 -0.20 -0.13	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Preschool Curriculum Evaluation Research Consortium. (2008g). Language-Focused Curriculum: University of Virginia. In <i>Effects of Preschool Curriculum Programs on School Readiness</i> (NCER No. 2008-2009) (pp. 109-116). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.	Cluster RCT	Language-Focused Curriculum	Business as usual	About 180 students in 14 preschool classrooms	L	S	PPVT	0.01	
							TOLD: Grammatical understanding	0.02	
					PA	S	Preschool CTOPP: Elision	0.20	
					D	S	WJ: Letter-word identification	0.15	
					W	S	WJ: Spelling	0.23	
					G	S	TERA	0.22	
Preschool Curriculum Evaluation Research Consortium. (2008h). Literacy Express and DLM Early Childhood Express Supplemented with Open Court Reading Pre-K: Florida State University. In <i>Effects of Preschool Curriculum Programs on School Readiness</i> (NCER 2008-2009) (pp. 117-130). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.	Cluster RCT	DLM Early Childhood Express supplemented with Open Court Reading Pre-K	Business as usual	About 190 students in 12 preschools	L	S	PPVT	0.51	
							TOLD: Grammatical understanding	0.40	
					PA	S	Preschool CTOPP: Elision	0.34	
					D	S	WJ: Letter-word identification	0.57	
					W	S	WJ: Spelling	0.56	
					G	S	TERA	0.69	*
		Literacy Express Preschool Curriculum	Business as usual	About 183 students in 12 preschools	L	S	PPVT	0.36	
							TOLD: Grammatical understanding	0.05	
					PA	S	Preschool CTOPP: Elision	0.29	
					D	S	WJ: Letter-word identification	0.33	
					W	S	WJ: Spelling	0.17	
					G	S	TERA	0.34	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Preschool Curriculum Evaluation Research Consortium. (2008i). Project Approach: Purdue University/University of Wisconsin. In <i>Effects of Preschool Curriculum Programs on School Readiness</i> (NCER No. 2008-2009) (pp. 143–151). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.	Cluster RCT	Project Approach	Business as usual	192 students in 12 preschools	L PA D W G	S S S S S	PPVT TOLD: Grammatical understanding Preschool CTOPP: Elision WJ: Letter-word identification WJ: Spelling TERA	-0.25 -0.31 -0.31 -0.06 -0.34 -0.36	
Price-Mohr, R., & Price, C. (2017). Gender differences in early reading strategies: A comparison of synthetic phonics only with a mixed approach to teaching reading to 4–5 year-old children. <i>Early Childhood Education Journal</i> , 45(5), 613–620. <a href="http://doi.org/10.1007/s10643-016-0813-y">http://doi.org/10.1007/s10643-016-0813-y</a> .	Cluster QED	Nonphonically decodable vocabulary with mixed teaching methods	Phonically decodable vocabulary with mixed teaching methods	176 students in 16 schools	L	S	BPVS	0.04	
RMC Research Corporation. (2003). <i>Ready, Set, Leap! Program: Newark prekindergarten study 2002-2003 final report</i> .	Cluster RCT	Ready, Set, Leap!	Business as usual	254 students in 17 preschools	L PA PK D	S S S S	PPVT-III Composite scores by averaging raw scores from DIBELS: Initial sound fluency, CTOPP: Blending words, and Woodcock-Johnson: Sound awareness—rhyming DIBELS: Letter naming fluency WJ: Letter-word identification	0.01 0.27 -0.08 0.12	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Ruston, H. P., & Schwanenflugel, P. J. (2010). Effects of a conversation intervention on the expressive vocabulary development of prekindergarten children. <i>Language, Speech, and Hearing Services in Schools</i> , 41(3), 303–313. <a href="https://eric.ed.gov/?id=EJ892596">https://eric.ed.gov/?id=EJ892596</a> .	RCT	Talking buddies	Business as usual	74 students in 6 classrooms in 4 preschool centers	L	S	Expressive Vocabulary Test	0.35	
						RD	Lexical diversity from language sample	0.21	
Russell, J. (2005). <i>An investigation of preschool oral language improvements through Ladders to Literacy</i> [Unpublished doctoral dissertation, University of New Hampshire].	Cluster RCT	Ladders to Literacy + Creative Curriculum	Business as usual	34 students in 12 preschools	L	RD	Mean length of utterance	-0.13	
							Type token ratio	0.05	
Sa, A. (2012). <i>Fostering preschoolers' narrative comprehension through inference making and story reenactment training</i> (UMI No. 3542680) [Doctoral dissertation, Lehigh University]. ProQuest Dissertations and Theses database.	RCT	Narrative Dynamics and story reenactment	Story Grammar/acting out	26 students in several preschool classrooms	L	RD	Story book comprehension book 1	0.63	
							Story book comprehension book 2	0.56	
							Retelling idea unit	0.28	
							Retelling story grammar elements	0.32	
							Retelling total comprehension	1.11	**
							Narrative picture sequence total	1.70	***
							S CELF: Expressive vocabulary	0.03	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Schwanenflugel, P. J., Hamilton, C. E., Neuharth-Pritchett, S., Restrepo, M. A., Bradley, B. A., & Webb, M. Y. (2010). PAVED for success: An evaluation of a comprehensive preliteracy program for four-year-old children. <i>Journal of Literacy Research</i> , 42(3), 227–275. <a href="https://eric.ed.gov/?id=EJ897192">https://eric.ed.gov/?id=EJ897192</a> .	Cluster RCT	Universal Quality Literacy Practices plus PAVEd for Success program focus on phonological awareness and explicit vocabulary enhancement practices	Universal Quality Literacy Practices plus PAVEd for Success program (PAVE) focus on phonological awareness only	163 students in 37 classrooms in 18 public schools	L	S	PPVT-III	-0.07	
							Expressive Vocabulary Test	-0.11	
					PA	RD	Adapted PAT	-0.12	
					PK	RD	Alphabet knowledge: Letter name	0.08	
							Alphabet knowledge: Letter sounds	-0.01	
Scott, D. D. (2005). <i>Investigating the behavioral outcomes of an early literacy intervention for at-risk preschool children</i> (UMI No. 3177496) [Doctoral dissertation, University of Virginia]. ProQuest Dissertations and Theses database.	Cluster RCT	Emergent literacy intervention	Business as usual	92 students in 6 Head Start classrooms	L	S	IGDI: Picture naming	-0.02	
Smith, S. H. (1998). <i>The effects of a whole language method of instruction and an integrated phonics method of instruction on the reading achievement of inner-city preschool pupils</i> (UMI No. 9826788) [Doctoral dissertation, The George Washington University]. ProQuest Dissertations and Theses database.	Cluster RCT	Integrated Phonics	Business as usual	114 students in 8 classrooms in 4 public elementary schools	D	S	WJ-Revised: Letter-word identification	1.25	**
							WJ-Revised: Word attack	0.38	
					W	S	WJ-Revised: Dictation	0.96	*

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Stockard, J. (2009). <i>Promoting early literacy of preschool children: A study of the effectiveness of Funnix Beginning Reading</i> (Technical Report No. 2009-1). National Institute of Direct Instruction. <a href="https://eric.ed.gov/?id=EJ908028">https://eric.ed.gov/?id=EJ908028</a> .	RCT	Funnix Beginning Reading computer program	Business as usual	37 students in 6 Head Start classrooms	PA	S	DIBELS: Phoneme segmentation fluency	2.18	***
					PK	S	DIBELS: Letter naming fluency	0.55	
					D	RD	100 word list	0.52	
							Controlled Text Passages	0.46	
						S	Woodcock Reading Mastery Tests: Word identification	0.99	**
							Woodcock Reading Mastery Tests: Word attack	1.46	***
							DIBELS: Nonsense word fluency	0.70	
Talley, S., Lancy, D. F., & Lee, T. R. (1997). Children, storybooks and computers. <i>Reading Horizons</i> , 38(2), 116–128. Retrieved March 13, 2018, from <a href="https://scholarworks.wmich.edu/reading_horizons/vol38/iss2/7/">https://scholarworks.wmich.edu/reading_horizons/vol38/iss2/7/</a> .	RCT	CD-ROM (IBM's Stories and More)	Business as usual	61 students in 8 classrooms in 1 Head Start center	PK	S	PAT	0.17	
							Concepts About Print	-0.09	
							Picnic test	-0.03	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Thompson, P. S. (2015). <i>Scaffolding emergent literacy skills in pre-kindergarten through writing instruction</i> (UMI No. 3702167) [Doctoral dissertation, Middle Tennessee State University]. ProQuest Dissertations and Theses database.	RCT	Interactive reading and writing intervention	Business as usual	174 students in 9 classrooms in 4 public schools	L PA PK	S S S	CPAA: Listening CPAA: Phonemic awareness COS: Letter recognition COS: Sound knowledge COS: Print knowledge CPAA: Phonics Test of Early Written Language CPAA: Reading	-0.20 0.42 ** -0.04 0.38 * 0.46 ** 0.22 0.10 0.08	
Trotti, J., Hendricks, R., & Bledsoe, C. (2017). Emergent literacy development and computer assisted instruction. <i>SRATE Journal</i> , 26(1), 30–39. <a href="https://eric.ed.gov/?id=EJ1134394">https://eric.ed.gov/?id=EJ1134394</a> .	RCT	Imagine Learning  Waterford Early Learning	Business as usual Business as usual	102 students 111 students	PA G PA G	S S S S	CIRCLE: Phonological awareness CIRCLE: Composite CIRCLE: Phonological awareness CIRCLE: composite	0.13 0.26 0.14 0.30	
Tyler, A. A., Lewis, K. E., Haskell, A., & Tolbert, L. C. (2003). Outcomes of different speech and language goal attack strategies. <i>Journal of Speech, Language, and Hearing Research</i> , 46(5), 1077–1094. <a href="https://eric.ed.gov/?id=EJ823316">https://eric.ed.gov/?id=EJ823316</a> .	RCT	Morphosyntax intervention	Business as usual	17 students in preschools	L	RD	Percent change in morphosyntactic performance	0.65	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Walsh, B. (2009). <i>Novel word learning of preschoolers enrolled in Head Start regular and bilingual classrooms: Impact of adult vocabulary noneliciting questions during shared storybook reading</i> (UMI No. 3384573) [Doctoral dissertation, Texas Woman's University]. ProQuest Dissertations and Theses database.	RCT	Storybook reading with noneliciting vocabulary questions	Storybook reading	29 students in 1 Head Start center	L	RD	Seasonal word comprehension game	0.11	
		Storybook reading with eliciting vocabulary questions	Storybook reading	30 students in 1 Head Start center			Seasonal word production game	0.15	
	RCT	Storybook reading with eliciting vocabulary questions	Storybook reading	23 students in childcare centers or nursery schools	L	RD	Seasonal word comprehension game	-0.34	
		Storybook reading with noneliciting vocabulary questions	Storybook reading	24 students in childcare centers or nursery schools			Seasonal word production game	0.46	
Walsh, B. A., & Blewitt, P. (2006). The effect of questioning style during storybook reading on novel vocabulary acquisition of preschoolers. <i>Early Childhood Education Journal</i> , 33(4), 273–278. <a href="https://eric.ed.gov/?id=EJ747238">https://eric.ed.gov/?id=EJ747238</a> .	RCT	Storybook reading with eliciting vocabulary questions	Storybook reading	23 students in childcare centers or nursery schools	L	RD	New Word Comprehension Test	3.38	***
		Storybook reading with noneliciting vocabulary questions	Storybook reading	24 students in childcare centers or nursery schools			New Word Production Test	0.59	
	RCT	My Sentence Builder	Non-computer-assisted treatment	22 students in government-funded speech and language programs	L	S	New Word Comprehension Test	2.12	***
							New Word Production Test	0.95	*
Washington, K. N., Warr-Leeper, G., & Thomas-Stonell, N. (2011). Exploring the outcomes of a novel computer-assisted treatment program targeting expressive-grammar deficits in preschoolers with SLI. <i>Journal of Communication Disorders</i> , 44(3), 315–330. <a href="https://eric.ed.gov/?id=EJ925765">https://eric.ed.gov/?id=EJ925765</a> .	RCT	Interactive book reading	Repeated reading	121 students in 4 classrooms in 1 Title I early learning center	L	RD	Structured Photographic Expressive Language Test—Preschool	0.04	
							Developmental sentence scoring	0.25	
	Cluster RCT	Interactive book reading	Repeated reading	121 students in 4 classrooms in 1 Title I early learning center	L	RD	Receptive vocabulary	1.58	**
							Expressive vocabulary	2.05	***
Wasik, B. A., & Bond, M. A. (2001). Beyond the pages of a book: interactive book reading and language development in preschool classrooms. <i>Journal of Educational Psychology</i> , 93(2), 243. <a href="https://eric.ed.gov/?id=EJ638739">https://eric.ed.gov/?id=EJ638739</a> .					S	PPVT-III	ne <sup>+</sup>		

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Wilcox, M. J., Gray, S. I., Guimond, A. B., & Lafferty, A. E. (2011). Efficacy of the TELL language and literacy curriculum for preschoolers with developmental speech and/or language impairment. <i>Early Childhood Research Quarterly, 26</i> (3), 278–294. <a href="https://eric.ed.gov/?id=EJ924085">https://eric.ed.gov/?id=EJ924085</a> .	Cluster RCT	Teaching Early Literacy and Language curriculum	Business as usual	118 students in 29 classrooms	W	S	PALS-PreK: Name writing	0.26	
Willoughby, D., Evans, M. A., & Nowak, S. (2015). Do ABC eBooks boost engagement and learning in preschoolers? An experimental study comparing eBooks with paper ABC and storybook controls. <i>Computers &amp; Education, 82</i> (1), 107–117. <a href="http://doi.org/10.1016/j.compedu.2014.11.008">http://doi.org/10.1016/j.compedu.2014.11.008</a> .	QED	Paper alphabet book reading	Storybook reading	59 students in public and private schools	PA	S	TOPA-Kindergarten: Initial sound-same subtest	0.15	
					PK	RD	Letter-naming task	0.15	
							Letter-sound task	-0.16	
		Electronic alphabet book reading	Storybook reading	62 students in public and private schools	PA	S	TOPA-Kindergarten: Initial sound-same subtest	0.06	
					PK	RD	Letter-naming task	-0.06	
							Letter-sound task	-0.26	
Witt, E. N. (2000). <i>Effects of reading styles on African-American preschoolers of disadvantage</i> (UMI No. 9998719) [Doctoral dissertation, Louisiana State University and Agricultural and Mechanical College]. ProQuest Dissertations and Theses database.	RCT	Performance-oriented storybook reading	Interactive storybook reading	20 students in 2 Head Start classrooms in 1 school	L	RD	Story retelling	0.33	
					PK	RD	World knowledge task	-0.31	
							Test of acquisition of literacy concepts	-0.60	
Wyant, A. B. (2008). <i>What type of extra-textual input is optimal for preschoolers' vocabulary learning during storybook reading?</i> (UMI No. 1454132) [Master's thesis, Villanova University]. ProQuest Dissertations and Theses database.	RCT	Storybook reading with eliciting vocabulary questions with full scaffolded questions and comments	Ostensive repetition	37 students in preschool classrooms	L	RD	Definition Comprehension	0.14	
								-0.23	

Citation	Study design	Intervention name	Nature of comparison group	Analysis sample	Outcome domain	Outcome type	Outcome measure	Effect size for measure	Significant after B-H correction
Yeh, S. S. (2003). An evaluation of two approaches for teaching phonemic awareness to children in Head Start. <i>Early Childhood Research Quarterly</i> , 18(4), 513–529. <a href="https://eric.ed.gov/?id=EJ778645">https://eric.ed.gov/?id=EJ778645</a> .	Cluster QED	Rhyming/alliteration intervention	Segmenting Intervention	44 students in 4 classrooms in 2 Head Start centers	PK D	RD RD	Letter-sound matching Oral reading	0.77 1.10	* ***
Zhou, N. (2014). <i>Effects of multimedia story reading on preschoolers' vocabulary learning, story comprehension and reading engagement</i> (UMI No. 3669649) [Doctoral dissertation, Purdue University]. ProQuest Dissertations and Theses database.	RCT	Storybook reading with questions	Storybook reading	36 students in several preschools	L	RD	Target vocabulary test	0.98	**
		Multimedia story reading with questions	Multimedia story reading	37 students in several preschools	L	RD	Target vocabulary test	0.17	
Zucker, T. A., Solari, E. J., Landry, S. H., & Swank, P. R. (2013). Effects of a brief tiered language intervention for prekindergartners at risk. <i>Early Education &amp; Development</i> , 24(3), 366–392. <a href="https://eric.ed.gov/?id=EJ1010582">https://eric.ed.gov/?id=EJ1010582</a> .	Cluster RCT	At risk Tier 2: Developing Talkers	At-risk comparison	119 students in 39 classrooms in Head Start centers, private childcare programs, and public schools	L S	RD	Listening comprehension CIRCLE Phonological Awareness, Language, and Literacy System: Rapid vocabulary naming	0.06 ne <sup>+</sup>	

\* is significant at  $p < .05$ ; \*\* is significant at  $p < .01$ ; \*\*\* is significant at  $p < .001$ .

Study design: RCT is randomized controlled trial.

Outcome domain: D is decoding. G is general literacy. L is language. PA is phonological awareness. PK is print knowledge. W is early writing.

Type of outcome measure: RD is researcher-developed measure. S is standardized measure.

Effect size for measure: ne is not enough information provided in the manuscript to calculate effect size (ne<sup>+</sup> indicates that the direction of the effect was positive, and ne<sup>u</sup> indicates that the direction of the effect is unknown).

Outcome measure: APT is Action Picture Test. BPVS is British Picture Vocabulary Scale. CELF is Clinical Evaluation of Language Fundamentals. CIRCLE is Center for Improving the Readiness of Children for Learning and Education. CLIP is Code and Language Intervention Post-test. COS is Clay's Observation Survey of Early Literacy Achievement. CPAA is Children's Progress Academic Assessment. CTOPP is Comprehensive Test of Phonological Processing. DELV is Diagnostic Evaluation of Language Variation. DIBELS is Dynamic Indicators of Basic Literacy Skills. EOWPVT is Expressive One-Word Picture Vocabulary Test. GGG is Get it, Got it, Go!. GRTR is Get Ready to Read. IGDI is Get It, Got It, Go! Individual Growth and Development Indicators. PALS is Phonological Awareness Literacy Screening. PAT is Phonological Awareness Test. PIPA is Pre-Reading Inventory of Phonological Awareness. PPVT is Peabody Picture Vocabulary Test. PWPA is Preschool Print and Word Awareness Assessment. TERA is Test of Early Reading Ability. TOLD is Test of Language Development. TOPA is Test of phonological awareness. TOPEL is Test of Preschool Emergent Literacy. TTR is Type Token Ratio. WJ is Woodcock-Johnson. WRAT is Wide Range Achievement Test. YARC is York Assessment of Reading Comprehension.

B-H correction is Benjamini-Hochberg correction (see box B1).

Note: Two studies (Wasik & Bond, 2001, and Zucker et al., 2013) reported sufficient information to calculate effect size for some outcomes but not all.

Source: Authors' compilation.

**Table E2. Research basis for the 14 single-case design studies determined to meet the evidence standards**

Citation	Design type	Intervention name	Sample size (case)	Outcome domain	Outcome type	Outcome measure	SCD evidence level <sup>a</sup>
Bredin-Oja, S. L. (2012). <i>Children's responses to grammatically complete and incomplete prompts to imitate</i> (UMI No. 3541650) [Doctoral dissertation, University of Kansas]. ProQuest Dissertations & Theses database.	Alternating treatment	Grammatically complete and incomplete prompts to imitate	1 (student 2)	L	RD	Number of responses containing a target semantic relation	No evidence
Craig-Unkefer, L. A. (1999). <i>Increasing the social-communicative skills of at-risk preschool-age children in a play context</i> (UMI No. 9929116) [Doctoral dissertation, Vanderbilt University]. ProQuest Dissertations & Theses database.	Multiple baseline across participants	Play sessions	6 (dyad 1, dyad 2, dyad 3)	L	RD	Peer-directed descriptive statements	No evidence
						Peer-directed requests	No evidence
						Peer-directed comments plus requests	No evidence
						Number of four or more word utterances	No evidence
						Number of different word roots	No evidence
						Total words	No evidence
Craig-Unkefer, L. A., & Kaiser, A. P. (2002). Improving the social communication skills of at-risk preschool children in a play context. <i>Topics in Early Childhood Special Education</i> , 22(1), 3–13. <a href="https://eric.ed.gov/?id=EJ645081">https://eric.ed.gov/?id=EJ645081</a> .	Multiple baseline across participants	Peer play	6 (dyad 1, dyad 2, dyad 3)	L	RD	Descriptive utterances	No evidence
						Request utterances	No evidence
Dennis, L. R., Whalon, K., Kraut, L., & Herron, D. (2016). Effects of a teacher versus iPad-facilitated intervention on the vocabulary of at-risk preschool children. <i>Journal of Early Intervention</i> , 38(3), 170–186. <a href="https://eric.ed.gov/?id=EJ1113679">https://eric.ed.gov/?id=EJ1113679</a> .	Alternating treatment	iPad instruction of target verb	1 (participant 1)	L	RD	Expressive probe gain score	No evidence
					RD	Receptive probe gain score	No evidence
			1 (participant 2)	L	RD	Expressive probe gain score	No evidence
					RD	Receptive probe gain score	Moderate (-)
			1 (participant 3)	L	RD	Expressive probe gain score	No evidence

Citation	Design type	Intervention name	Sample size (case)	Outcome domain	Outcome type	Outcome measure	SCD evidence level <sup>a</sup>
					RD	Receptive probe gain score	No evidence
			1 (participant 4)	L	RD	Expressive probe gain score	No evidence
					RD	Receptive probe gain score	No evidence
			1 (participant 5)	L	RD	Expressive probe gain score	No evidence
					RD	Receptive probe gain score	No evidence
Hsin, Y. W. (2007). <i>Effects of phonological awareness instruction on pre-reading skills of preschool children at-risk for reading disabilities</i> [Doctoral dissertation, The Ohio State University]. Retrieved November 29, 2018, from <a href="https://etd.ohiolink.edu/">https://etd.ohiolink.edu/</a> .	Multiple probe across participants	Phonological awareness instruction	1 (Tracy, Steph, Henry)	PA	S	DIBELS: Phoneme segmentation fluency	No evidence
						DIBELS: Nonsense word fluency	No evidence
Kruse, L. (2013). <i>Small groups, big gains: Efficacy of a tier 2 phonological awareness intervention with preschoolers using a multiple-baseline design</i> (UMI No. 3673735) [Doctoral dissertation, The Ohio State University]. ProQuest Dissertations and Theses database.	Multiple probe across participants	Phonological awareness intervention	7 (Eva, Courtney, Teshwan, Andre, Kaylee, Anna, Cristina)	PA	RD	Modified DIBELS first sound fluency	No evidence
						Modified DIBELS word parts fluency	No evidence
Lovelace, T. S. (2008). <i>The effects of explicit phonological awareness instruction on the prereading skills of preschool children at risk for reading failure: Comparing single and multiple skill instructional strategies</i> [Doctoral dissertation, The Ohio State University]. Retrieved August 3, 2018, from <a href="https://etd.ohiolink.edu/">https://etd.ohiolink.edu/</a> .	Multiple baseline across settings	Multiple skill phonological awareness instruction	1 (student 1)	PA	RD	Number correct on multiple phonological awareness tasks	Strong (+)
			1 (student 5)	PA	RD	Number correct on multiple phonological awareness tasks	No evidence
McLeod, R. H., Hardy, J. K., & Kaiser, A. P. (2017). The effects of play-based intervention on vocabulary acquisition by preschoolers at risk for reading and language delays. <i>Journal of Early Intervention</i> , 39(2), 147–160. <a href="https://eric.ed.gov/?id=EJ1140020">https://eric.ed.gov/?id=EJ1140020</a> .	Multiple probe across settings	Book reading and Enhanced Milieu Teaching play	1 (Caleb)	L	RD	Number of target words used	Strong (+)
			1 (Jacorius)	L	RD	Number of target words used	No evidence

Citation	Design type	Intervention name	Sample size (case)	Outcome domain	Outcome type	Outcome measure	SCD evidence level <sup>a</sup>
Noe, S., Spencer, T. D., Kruse, L., & Goldstein, H. (2014). Effects of a tier 3 phonological awareness intervention on preschoolers' emergent literacy. <i>Topics in Early Childhood Special Education</i> , 34(1), 27–39. <a href="https://eric.ed.gov/?id=EJ1022226">https://eric.ed.gov/?id=EJ1022226</a> .	Multiple probe across participants	Phonological awareness intervention (first sound identification)	7 (Jerome, Tanisha, Marcus, Jada, Victoria, Amber, Connor)	PA	S	DIBELS: First sound fluency	No evidence
Olszewski, A. (2015). <i>Modeling alphabet skills as instructive feedback within a phonological awareness curriculum</i> (Order No. 3738434) [Doctoral dissertation, University of South Florida]. ProQuest Dissertations and Theses database.	Multiple baseline across settings	Modified PAth to Literacy	1 (Ben)	PA	RD	Phonological awareness fluency measure	No evidence
			PK	RD	Alphabet Mastery Monitor	No evidence	
			1 (Brandon)	PA	RD	Phonological awareness fluency measure	No evidence
			PK	RD	Alphabet Mastery Monitor	No evidence	
			1 (Edgar)	PA	RD	Phonological awareness fluency measure	No evidence
			PK	RD	Alphabet Mastery Monitor	No evidence	
			1 (Elijah)	PA	RD	Phonological awareness fluency measure	Strong (+)
			PK	RD	Alphabet Mastery Monitor	Moderate	
			1 (Jose)	PA	RD	Phonological awareness fluency measure	No evidence
			PK	RD	Alphabet Mastery Monitor	No evidence	
			1 (Joshua)	PA	RD	Phonological awareness fluency measure	No evidence
			PK	RD	Alphabet Mastery Monitor	No evidence	
			1 (Matthew)	PA	RD	Phonological awareness fluency measure	No evidence
			PK	RD	Alphabet Mastery Monitor	No evidence	

Citation	Design type	Intervention name	Sample size (case)	Outcome domain	Outcome type	Outcome measure	SCD evidence level <sup>a</sup>
Sheldon, K. M. (1997). <i>Effects of a milieu teaching strategy in a storybook context on the acquisition, maintenance, and generalization of expressive language by young children with developmental disabilities</i> (Order No. 9801786) [Doctoral dissertation, The Ohio State University]. ProQuest Dissertations and Theses database.	Multiple baseline across settings	Milieu teaching strategy	1 (Michael)	PA	RD	Phonological awareness fluency measure	No evidence
				PK	RD	Alphabet Mastery Monitor	No evidence
Stanton-Chapman, T. L. (2004). <i>Building social communication skills during peer interaction using storybooks</i> (UMI No. 3127279) [Doctoral dissertation, Vanderbilt University]. ProQuest Dissertations and Theses database.	Alternating treatment	Book reading and play	1 (A1)	L	RD	Social programmatic outcome	No evidence
			1 (A2)	L	RD	Social programmatic outcome	No evidence
			1 (B1)	L	RD	Social programmatic outcome	No evidence
			1 (B2)	L	RD	Social programmatic outcome	No evidence
			1 (C1)	L	RD	Social programmatic outcome	No evidence
			1 (C2)	L	RD	Social programmatic outcome	No evidence
			1 (D1)	L	RD	Social programmatic outcome	No evidence
			1 (D2)	L	RD	Social programmatic outcome	No evidence

Citation	Design type	Intervention name	Sample size (case)	Outcome domain	Outcome type	Outcome measure	SCD evidence level <sup>a</sup>
Stanton-Chapman, T. L., Denning, C. B., & Jamison, K. R. (2012). Communication skill building in young children with and without disabilities in a preschool classroom. <i>The Journal of Special Education</i> , 46(2), 78–93. <a href="https://eric.ed.gov/?id=EJ972255">https://eric.ed.gov/?id=EJ972255</a> .	Multiple baseline across participants	Book reading and play sessions	8 (A1, A2, B1, B2, C1, C2, D1, D2)	L	RD	Frequency of initiated behavior that resulted in a peer	Moderate (+)
Whitlow, C. K. G. (2003). <i>Video self-modeling as an intervention for specific language impairment in preschoolers</i> (UMI No. 3095690) [Doctoral dissertation, The University of Memphis]. ProQuest Dissertations and Theses database.	Multiple baseline across participants	Video self-modeling	3 (Stephanie, Corey, and Leslie)	L	RD	Percent grammatical morpheme usage Mean length of utterance	No evidence No evidence

Outcome domain: D is decoding. G is general literacy. L is language. PA is phonological awareness. PK is print knowledge. W is early writing.

Type of outcome measure: S is standardized measure. RD is researcher-developed measure.

Outcome measure: DIBELS is Dynamic Indicators of Basic Literacy Skills.

Note: See appendix F for the complete citation associated with each study evaluating the interventions.

a. Refers to the characterization of findings under the pilot What Works Clearinghouse standards for single-case designs.

Source: Authors' compilation.

## Appendix F. Three-hundred fifty-seven studies reviewed using the evidence standards

An asterisk denotes studies that the study team rated as high-quality impact studies using the What Works Clearinghouse evidence standards, version 4.0.

Abel, K. D. (2001). *Analysis of collaborative E-mail use on the language acquisition of pre-school children aged 4 and 5* (UMI No. 3010775) [Doctoral dissertation, Stevens Institute of Technology]. ProQuest Dissertations & Theses database.

Aguilar, J. M. (2017). *Exemplar variability facilitates word learning by children with specific language impairment* (Order No. 10254084) [Doctoral dissertation, The University of Arizona]. ProQuest Dissertations & Theses database.

Additional source: Aguilar, J. M. (2017). Exemplar variability facilitates word learning by children with specific language impairment. *Language, Speech, and Hearing Services in Schools*, 49(1), 72–84. <https://eric.ed.gov/?id=EJ1166681>.

Allain, S. M. (2001). *Effectiveness of a phonemic awareness intervention with four and five year olds* (UMI No. 3027639) [Doctoral dissertation, Texas Woman's University]. ProQuest Dissertations & Theses database.

\*Allison, J. C. (2016). *Electronic picture books: Do they support the construction of print knowledge in young emergent literacy learners?* (Order No. 10193515) [Doctoral dissertation, Temple University]. ProQuest Dissertations & Theses database.

Alman, L. F. (2003). *The effects of a computer-mediated intervention on “at-risk” preschool students’ receptive vocabulary and computer literacy skills* (UMI No. 3123024) [Doctoral dissertation, Temple University]. ProQuest Dissertations & Theses database.

Ard, L. M., & Beverly, B. L. (2004). Preschool word learning during joint book reading: Effect of adult questions and comments. *Communication Disorders Quarterly*, 26(1), 17–28. <https://eric.ed.gov/?id=EJ722299>.

Ascetta, K. E. (2017). *The features of effective online professional development for early childhood educators* (Order No. 10608077) [Doctoral dissertation, University of Oregon]. ProQuest Dissertations & Theses database.

\*Assel, M. A., Landry, S. H., Swank, P. R., & Gunnewig, S. (2007). An evaluation of curriculum, setting, and mentoring on the performance of children enrolled in pre-kindergarten. *Reading and Writing*, 20(5), 463–494. <https://eric.ed.gov/?id=EJ774756>.

Additional source: Preschool Curriculum Evaluation Research Consortium. (2008e). Doors to Discovery and Let's Begin with the Letter People: University of Texas Health Science Center at Houston. In *Effects of preschool curriculum programs on school readiness* (NCER No. 2008-2009) (pp. 85–98). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.

Aziz, S. A., Fletcher, J., & Bayliss, D. M. (2016). The effectiveness of self-regulatory speech training for planning and problem solving in children with specific language impairment. *Journal of Abnormal Child Psychology*, 44(6), 1045–1059. <http://doi.org/10.1007/s10802-015-0115-7>.

Baciu, I. E. (2010). *Vocabulary and phonological awareness in 3- to 4-year-old children: Effects of a training program* (Order No. NR68757) [Doctoral dissertation, Wilfrid Laurier University]. ProQuest Dissertations & Theses Database.

\*Bailet, L. L., Repper, K. K., Piasta, S. B., & Murphy, S. P. (2009). Emergent literacy intervention for prekindergarteners at risk for reading failure. *Journal of Learning Disabilities*, 42(4), 336–355. <https://eric.ed.gov/?id=EJ843696>.

Additional source: Bailet, L. L., Repper, K., Murphy, S., Piasta, S., & Zettler-Greeley, C. (2013). Emergent literacy intervention for prekindergarteners at risk for reading failure: Years 2 and 3 of a multiyear study. *Journal of Learning Disabilities*, 46(2), 133–153. <https://eric.ed.gov/?id=EJ1009184>.

Barton, K. (2013). *Literacy and dramatic play: storytelling with props increases preschool children’s language skills during play* (UMI No. 1545786) [Master’s thesis, University of Alabama]. ProQuest Dissertations and Theses database.

Bass, L. A. (2008). *Effects of interactive storybook reading on the morphosyntactic development of preschool children from low-income environments* (UMI No. 3282566) [Doctoral dissertation, Florida State University]. ProQuest Dissertations and Theses database.

Bass, L. A., & Barron, E. V. (2014). Effects of instructional condition on preschool children's novel word learning. *Infants & Young Children*, 27(2), 136–161. <https://eric.ed.gov/?id=EJ1065236>.

Beale, N. A. (2009). *Effects of utilizing educational TV shows and conversational recasting on language skills of preschoolers with specific language impairments* (Order No. 3336651) [Doctoral dissertation, Walden University]. ProQuest Dissertations & Theses Database.

Bellin, H. F., & Singer, D. G. (2006). My magic story car: video-based play to strengthen emergent literacy of at-risk preschoolers. In D. G., Singer, R. M. Golinkoff, & K. Hirsh-Pasek (Eds.), *Play = Learning: How Play Motivates and Enhances Children's Cognitive and Social-Emotional Growth* (pp. 101–123). Oxford University Press. <http://doi.org/10.1093/9780195304381.003.0006>.

Bellon-Harn, M. L. (2012). Dose frequency: Comparison of language outcomes in preschool children with language impairment. *Child Language Teaching and Therapy*, 28(2), 225–240. <https://eric.ed.gov/?id=EJ964268>.

Bellon-Harn, M. L., Byers, B. A., & Lappi, J. (2014). Treatment intensity: Effects of interactive book reading on narrative abilities in preschool children with SLI. *Communication Disorders Quarterly*, 35(4), 226–236. <http://doi.org/10.1177/1525740114524051>.

Bennett, C. (2006). *What are the effects of "Breakthrough to Literacy" in a prekindergarten classroom?* [Unpublished master's thesis, Midwestern State University].

Bickford-Smith, A., Wijayatilake, L., & Woods, G. (2005). Evaluating the effectiveness of an early years language intervention. *Educational Psychology in Practice*, 21(3), 161–173. <https://eric.ed.gov/?id=EJ694767>.

\*Bierman, K. L., Domitrovich, C. E., Nix, R. L., Gest, S. D., Welsh, J. A., Greenberg, M. T., Blair, C., Nelson, K. E., & Gill, S. (2008). Promoting academic and social-emotional school readiness: The head start REDI program. *Child Development*, 79(6), 1802–1817. <https://eric.ed.gov/?id=EJ818718>.

Additional source: Bierman, K. L., Nix, R. L., Greenberg, M. T., Blair, C., & Domitrovich, C. E. (2008). Executive functions and school readiness intervention: Impact, moderation, and mediation in the Head Start REDI program. *Development and Psychopathology*, 20(3), 821–843. <http://doi.org/10.1017/S0954579408000394>.

Additional source: Bierman, K. L., Nix, R. L., Heinrichs, B. S., Domitrovich, C. E., Gest, S. D., Welsh, J. A., & Gill, S. (2014). Effects of Head Start REDI on children's outcomes 1 year later in different kindergarten contexts. *Child Development*, 85(1), 140–159. <https://eric.ed.gov/?id=EJ1027520>.

\*<sup>2</sup>Blewitt, P., Rump, K. M., Shealy, S. E., & Cook, S. A. (2009). Shared book reading: When and how questions affect young children's word learning. *Journal of Educational Psychology*, 101(2), 294. <https://eric.ed.gov/?id=EJ835037>.

\*Bochna, C. R. (2006). *The impact of instruction in text structure on listening comprehension in preschool age students* (UMI No. 3378045) [Doctoral dissertation, The Pennsylvania State University]. ProQuest Dissertations & Theses database.

Boit, R. J. (2010). *A comparison study on the effects of the standardized and a teacher modified dialogic reading programs on early literacy outcomes of preschool children from low income communities* (UMI No. 3427495) [Doctoral dissertation, University of Massachusetts Amherst]. ProQuest Dissertations & Theses database.

Bortnem, G. M. (2005). *The effects of using non-fiction interactive read-alouds on expressive and receptive vocabulary of preschool children* (UMI No. 3188194) [Doctoral dissertation, The University of South Dakota]. ProQuest Dissertations & Theses database.

\*Bowyer-Crane, C., Snowling, M. J., Duff, F. J., Fieldsend, E., Carroll, J. M., Miles, J., Gotz, C., & Hulme, C. (2008). Improving early language and literacy skills: Differential effects of an oral language versus a phonology with reading intervention. *Journal of Child Psychology and Psychiatry*, 49(4), 422–432. <https://eric.ed.gov/?id=EJ812879>.

<sup>2</sup> This manuscript includes two experiments that were reviewed as separate studies. Experiment 1 was rated as not meeting the evidence standards, and experiment 2 was rated as meeting the evidence standards.

Additional source: Hulme, C., Bowyer-Crane, C., Carroll, J. M., Duff, F. J., & Snowling, M. J. (2012). The causal role of phoneme awareness and letter-sound knowledge in learning to read: Combining intervention studies with mediation analyses. *Psychological Science*, 23(6), 572–577. <http://doi.org/10.1177/0956797611435921>.

\*Boyer, N. E. (2010). *Phonemic awareness instruction: Effects of letter manipulation and articulation training on learning to read and spell* (UMI No. 3426368) [Doctoral dissertation, The City University of New York]. ProQuest Dissertations & Theses database.

Additional source: Boyer, N., & Ehri, L. C. (2011). Contribution of phonemic segmentation instruction with letters and articulation pictures to word reading and spelling in beginners. *Scientific Studies of Reading*, 15(5), 440–470. <https://eric.ed.gov/?id=EJ933946>.

\*Bredin-Oja, S. L. (2012). *Children's responses to grammatically complete and incomplete prompts to imitate* (UMI No. 3541650) [Doctoral dissertation, University of Kansas]. ProQuest Dissertations & Theses database.

\*Brigman, G., Lane, D., Switzer, D., Lane, D., & Lawrence, R. (1999). Teaching children school success skills. *The Journal of Educational Research*, 92(6), 323–329. <http://doi.org/10.1080/00220679909597615>.

Butler, M. C. (2012). *Implementation of evidence-based book-reading strategies by Head Start teachers: Benefits of professional development and effect on children's literacy outcomes* (UMI No. 3512230) [Doctoral dissertation, University of Wisconsin, Madison]. ProQuest Dissertations & Theses database.

Buysse, V., Peisner-Feinberg, E., & Burchinal, M. (2012, March). *Recognition & response: Developing and evaluating a model of RTI for pre-k*. Paper presented at the Sixth Society for Research on Educational Effectiveness Conference, Washington, DC. <https://eric.ed.gov/?id=ED530413>.

\*Cabell, S. Q., Justice, L. M., Piasta, S. B., Curenton, S. M., Wiggins, A., Turnbull, K. P., & Petscher, Y. (2011). The impact of teacher responsiveness education on preschoolers' language and literacy skills. *American Journal of Speech-Language Pathology*, 20(4), 315–330. <https://eric.ed.gov/?id=EJ946267>.

Additional source: Johanson, M., Justice, L. M., & Logan, J. (2016). Kindergarten impacts of a preschool language-focused intervention. *Applied Developmental Science*, 20(2), 94–107. <https://eric.ed.gov/?id=ED566470>.

Additional source: Piasta, S. B., Justice, L. M., Cabell, S. Q., Wiggins, A. K., Turnbull, K. P., & Curenton, S. M. (2012). Impact of professional development on preschool teachers' conversational responsiveness and children's linguistic productivity and complexity. *Early Childhood Research Quarterly*, 27(3), 387–400. <https://eric.ed.gov/?id=EJ974447>.

Cadeau, T. N. (2011). *Can the Headsprout Early Reading Program improve reading skills in a Head Start preschool classroom?* (UMI No. 1493476) [Master's thesis, Northern Michigan University]. ProQuest Dissertations & Theses database.

\*Callcott, D., Hammond, L., & Hill, S. (2015). The synergistic effect of teaching a combined explicit movement and phonological awareness program to preschool aged students. *Early Childhood Education Journal*, 43(3), 201–211. <https://eric.ed.gov/?id=EJ1055702>.

\*Callihan, K. D. (2003). *Emergent literacy activities in preschool years: The effects of explicit instruction on rhyming and narrative development* (UMI No. 1418524) [Master's thesis, Marshall University]. ProQuest Dissertations & Theses database.

Carson, C. J. (2012). *Read with me: examining the effects of a community volunteer reading program on preschoolers' literacy skills* (UMI No. 3513912) [Doctoral dissertation, The University of Toledo]. ProQuest Dissertations & Theses database.

Carson, K. L., Gillon, G. T., & Boustead, T. M. (2013). Classroom phonological awareness instruction and literacy outcomes in the first year of school. *Language, Speech, and Hearing Services in Schools*, 44(2), 147–160. <https://eric.ed.gov/?id=EJ1003987>.

Castles, A., Coltheart, M., Wilson, K., Valpied, J., & Wedgwood, J. (2009). The genesis of reading ability: What helps children learn letter-sound correspondences? *Journal of Experimental Child Psychology*, 104(1), 68–88. <https://eric.ed.gov/?id=EJ842241>.

\*Cesar, R. (2013). *Read alouds in the preschool classroom: A tool for developing pre-emergent vocabulary, print awareness, and comprehension skills* (UMI No. 3578578) [Doctoral dissertation, University of Phoenix]. ProQuest Dissertations & Theses database.

Chambers, B., Chamberlain, A., Hurley, E. A., & Slavin, R. E. (2001, April). *Curiosity Corner: Enhancing preschoolers' language abilities through comprehensive reform*. Paper presented at the Eleventh Annual Meeting of the American Educational Research Association Conference, Seattle, WA. <https://eric.ed.gov/?id=ED457999>.

Chan, R. J. (2016). *The effectiveness of explicit storybook comprehension instruction for improving preschool children's narrative comprehension skills* (UMI No. 3713515) [Doctoral dissertation, University of Kansas]. ProQuest Dissertations & Theses database.

Chera, P., & Wood, C. (2003). Animated multimedia 'talking books' can promote phonological awareness in children beginning to read. *Language and Instruction*, 13(1), 33–52. <https://eric.ed.gov/?id=EJ670644>.

\*Christie, J., Roskos, K., Vukelich, C., & Han, M. (2003). The effects of a well-designed literacy program on young children's language and literacy development. In F. Lamb-Parker, J. Hagan, R. Robinson, & H. Rhee (Eds.), *The first eight years, Pathways to the future: Implications for research, policy, and practice, Head Start's Sixth National Research Conference* (pp. 453–454). Columbia University, Mailman School of Public Health. <https://eric.ed.gov/?id=ED474955>.

Additional source: Han, M., Roskos, K., Christie, J., Mandzuk, S., & Vukelich, C. (2005). Learning words: Large group time as a vocabulary development opportunity. *Journal of Research in Childhood Education*, 19(4), 333–345. <https://eric.ed.gov/?id=EJ726431>.

\*Ciancio, D. J. (2004). *Early intervention: Effects of behavioral regulation on learning and emerging self-competence* (UMI No. 3116629) [Doctoral dissertation, University of Notre Dame]. ProQuest Dissertations & Theses database.

Cleven, J. G. (2006). *Training and mentoring childcare providers in story sharing: Effects on vocabulary and story retelling for four-year olds, and story sharing behaviors of childcare providers* (UMI No. 3247020) [Doctoral dissertation, North Carolina State University]. ProQuest Dissertations & Theses database.

\*Clouser, K. F. (2001). *The effects of setting storybooks' texts to music on story comprehension, vocabulary, and attitude towards reading in preschool children* [Unpublished master's thesis, Florida State University].

Colangelo, D. A. (2010). *An evaluation of a dialogic book-reading program for at risk children* (Order No. MR68719) [Master's thesis, Wilfrid Laurier University]. ProQuest Dissertations & Theses database.

Combs, S. G. (2009). *The effects of information sharing and modeling on teacher talk and child language in dramatic play* (UMI No. 3368449) [Doctoral dissertation, University of Cincinnati]. ProQuest Dissertations & Theses database.

Cook, S. A. (2008). *Asking questions during shared book reading: The effects of demand level on the acquisition of novel vocabulary words* (UMI No. 1459978) [Master's thesis, Villanova University]. ProQuest Dissertations & Theses database.

Correll, K. (2008). *A program evaluation of a conversational instruction program for the vocabulary development of four-year-old students in preschool classes* (UMI No. 3345070) [Doctoral dissertation, University of Houston]. ProQuest Dissertations & Theses database.

Coulter, L., & Gallagher, C. (2001). Evaluation of the Hanen Early Childhood Educators Programme. *International Journal of Language & Communication Disorders*, 36, 264–269. <https://onlinelibrary.wiley.com/journal/14606984>.

Covington, T. M. (2006). *Effects of rate-based responding on comprehension and maintenance of textual responding in beginning readers* (UMI No. 3203746) [Doctoral dissertation, Columbia University]. ProQuest Dissertations & Theses database.

\*Craig-Unkefer, L. A. (1999). *Increasing the social-communicative skills of at-risk preschool-age children in a play context* (UMI No. 9929116) [Doctoral dissertation, Vanderbilt University]. ProQuest Dissertations & Theses database.

Additional source: Craig-Unkefer, L. A., & Kaiser, A. P. (2003). Increasing peer-directed social-communication skills of children enrolled in Head Start. *Journal of Early Intervention*, 25(4), 229–247. <https://eric.ed.gov/?id=EJ674626>.

\*Craig-Unkefer, L. A., & Kaiser, A. P. (2002). Improving the social communication skills of at-risk preschool children in a play context. *Topics in Early Childhood Special Education*, 22(1), 3–13. <https://eric.ed.gov/?id=EJ645081>.

Crain-Thoreson, C., & Dale, P. S. (1999). Enhancing linguistic performance: Parents and teachers as book reading partners for children with language delays. *Topics in Early Childhood Special Education*, 19(1), 28–39. <https://eric.ed.gov/?id=EJ583795>.

Crawley, A. M., Anderson, D. R., Wilder, A., Williams, M., & Santomero, A. (1999). Effects of repeated exposures to a single episode of the television program Blue's Clues on the viewing behaviors and comprehension of preschool children. *Journal of Educational Psychology*, 91(4), 630–637. <http://doi.org/10.1037/0022-0663.91.4.630>.

Culatta, B., Kovarsky, D., Theodore, G., Franklin, A., & Timler, G. (2003). Quantitative and qualitative documentation of early literacy instruction. *American Journal of Speech-Language Pathology*, 12(2), 172–188. [http://doi.org/10.1044/1058-0360\(2003/064\)](http://doi.org/10.1044/1058-0360(2003/064)).

Currier, A. R. (2013). *Effects of a classroom-based pre-literacy intervention for preschoolers with communication disorders* (UMI No. 3589010) [Doctoral dissertation, University of Massachusetts Amherst]. ProQuest Dissertations & Theses database.

Cusumano, D. L. (2005). *Early learning experiences: Education with coaching and the effects on the acquisition of literacy skills in preschool children* [Doctoral dissertation, University of South Florida]. <https://scholarcommons.usf.edu/etd/2843/>.

Additional source: Cusumano, D. L., Armstrong, K., Cohen, R., & Todd, M. (2006). Indirect impact: How early childhood educator training and coaching impacted the acquisition of literacy skills in preschool students. *Journal of Early Childhood Teacher Education*, 27(4), 363–377. <https://eric.ed.gov/?id=EJ831012>.

Dahlke, K. A. (2016). *Improving early childhood caregiver quality and child outcomes through low-intensity classroom observation and individualized instructional feedback* (UMI No. 1794656212) [Doctoral dissertation, Northwestern University]. ProQuest Dissertations & Theses Global.

Danger, S. E. (2003). *Child-centered group play therapy with children with speech difficulties* (UMI No. 3106872) [Doctoral dissertation, University of North Texas]. ProQuest Dissertations & Theses database.

Additional source: Danger, S., & Landreth, G. (2005). Child-centered group play therapy with children with speech difficulties. *International Journal of Play Therapy*, 14(1), 81–102. <http://doi.org/10.1037/h008897>.

\*Davidson, M. R., Fields, M. K., & Yang, J. (2009). A randomized trial study of a preschool literacy curriculum: The importance of implementation. *Journal of Research on Educational Effectiveness*, 2(3), 177–208. <https://eric.ed.gov/?id=EJ866975>.

Davis, C. G. (2006). *The effects of a developmental articulation approach to emergent literacy instruction on Head Start students' reading achievement* (UMI No. 3213874) [Doctoral dissertation, Indiana University of Pennsylvania]. ProQuest Dissertations & Theses database.

Deak, G. O., & Toney, A. J. (2013). Young children's fast mapping and generalization of words, facts, and pictograms. *Journal of Experimental Child Psychology*, 115(2), 273–296. <https://eric.ed.gov/?id=EJ1007472>.

DeBaryshe, B. D., & Gorecki, D. M. (2007). An experimental validation of a preschool emergent literacy curriculum. *Early Education and Development*, 18(1), 93–110. <https://eric.ed.gov/?id=EJ772200>.

\*Dennis, L. R., Whalon, K., Kraut, L., & Herron, D. (2016). Effects of a teacher versus iPad-facilitated intervention on the vocabulary of at-risk preschool children. *Journal of Early Intervention*, 38(3), 170–186. <https://eric.ed.gov/?id=EJ1113679>.

\*Desmond, S. K. (2008). *The effects of rhyme on phonological sensitivities* (UMI No. 3326012) [Doctoral dissertation, Seattle Pacific University]. ProQuest Dissertations & Theses database.

Domack, A. M. (2005). *The effect of a dialogic reading intervention on the emergent literacy skills of preschool students* (UMI No. EP73972) [Master's thesis, University of Nebraska]. ProQuest Dissertations & Theses database.

Downer, J., Pianta, R., Fan, X., Hamre, B., Mashburn, A., & Justice, L. (2011). Effects of web-mediated teacher professional development on the language and literacy skills of children enrolled in pre-kindergarten programs. *NHSA dialog*, 14(4), 189–212. <http://doi.org/10.1080/15240754.2011.613129>.

Additional source: Mashburn, A. J., Downer, J. T., Hamre, B. K., Justice, L. M., & Pianta, R. C. (2010). Consultation for teachers and children's language and literacy development during pre-kindergarten. *Applied Developmental Science*, 14(4), 179–196. <https://eric.ed.gov/?id=EJ904113>.

Additional source: Cabell, S. Q., & Downer, J. T. (2011). Improving preschoolers' language and literacy skills through web-mediated professional development. *NHSA dialog*, 14(4), 316–322. <https://eric.ed.gov/?id=EJ951210>.

Additional source: Pianta, R. C., Mashburn, A. J., Downer, J. T., Hamre, B. K., & Justice, L. (2008). Effects of web-mediated professional development resources on teacher-child interactions in pre-kindergarten classrooms. *Early Childhood Research Quarterly*, 23(4), 431–451. <https://eric.ed.gov/?id=EJ820560>.

Dwyer, J. C. (2010). *Investigating the efficacy of a preschool vocabulary intervention designed to increase vocabulary size and conceptual knowledge* (UMI No. 3429493) [Doctoral dissertation, University of Michigan]. ProQuest Dissertations & Theses database.

Edmonds, E., O'Donoghue, C., Spano S., & Algozzine, R. F. (2009) Learning when school is out. *The Journal of Educational Research*, (102)3, 213–222. <https://eric.ed.gov/?id=EJ821079>.

Edwards, J. R., & Rosin, P. (2016). A prekindergarten curriculum supplement for enhancing mainstream American English knowledge in nonmainstream American English speakers. *Language, Speech, and Hearing Services in Schools*, 47(2), 113–122. <https://eric.ed.gov/?id=EJ1100996>.

Ervast, D. (2017). *The effects of a music curriculum on the pre-reading and writing skills of three- to five-year-olds in an inclusive day care setting* (Order No. 10264636) [Master's thesis, Florida State University]. ProQuest Dissertations & Theses database.

\*Esler, A. N. (2001). *Children at the venter: Promoting child development through evidence-based practice* (UMI No. 9997644) [Master's thesis, University of Minnesota]. ProQuest Dissertations & Theses database.

Fantuzzo, J. W., Gadsden, V. L., & McDermott, P. A. (2011). An integrated curriculum to improve mathematics, language, and literacy for Head Start children. *American Educational Research Journal*, 48(3), 763–793. <https://eric.ed.gov/?id=EJ924275>.

Fehrenbach, L. A., Hurford, D. P., Fehrenbach, C. R., & Brannock, R. G. (1998). Developing the emergent literacy of preschool children through a library outreach program. *Journal of Youth Services in Libraries*, 12(1), 40–45. <https://eric.ed.gov/?id=EJ584169>.

Filler, A., Wolery, M., & Anthony, L. (1999). Promoting children's conversations during play with adult prompts. *Journal of Early Intervention*, 22(2), 93-108. <https://eric.ed.gov/?id=EJ585815>.

\*Fischel, J. E., Bracken, S. S., Fuchs-Eisenberg, A., Spira, E. G., Katz, S., & Shaller, G. (2007). Evaluation of curricular approaches to enhance preschool early literacy skills. *Journal of Literacy Research*, 39(4), 471–501. <http://doi.org/10.1080/10862960701675333>.

Flanagan, E. G. O. (2006). *Computer-based reading program with at-risk pre-kindergarten students* (UMI No. 3238363) [Doctoral dissertation, Nova Southeastern University]. ProQuest Dissertations & Theses database.

Flanigan, J. H. (2016). *Effects of book genre on preschoolers' acquisition of targeted vocabulary during classroom read-alouds* (Order No. 10144380) [Doctoral dissertation, Temple University]. ProQuest Dissertations & Theses database.

Foran, M. (2015). *The effects of overselective responding on learning by exclusion in preschool children* (Order No. 10014819) [Master's thesis, University of Massachusetts Lowell]. ProQuest Dissertations & Theses database.

Fort Worth Independent School District. (2003). *Controlled study: Stanford Achievement Tests, Ninth Edition-Kindergarten reading*. Breakthrough to Literacy.

Frank, S. T. (2015). *The use of explicit, non-evocative print referencing with preschool children at-risk: Implications for increasing print concept knowledge* (UMI No. 3584070) [Doctoral dissertation, University of Kentucky]. ProQuest Dissertations & Theses database.

\*Fricke, S., Bowyer-Crane, C., Haley, A. J., Hulme, C., & Snowling, M. J. (2013). Efficacy of language intervention in the early years. *Journal of Child Psychology and Psychiatry*, 54(3), 280–290. <https://eric.ed.gov/?id=EJ1012716>.

\*Fricke, S., Burgoyne, K., Bowyer-Crane, C., Kyriacou, M., Zosimidou, A., Maxwell, L., Lervåg, A., Snowling, M. J., & Hulme, C. (2017). The efficacy of early language intervention in mainstream school settings: A randomized controlled trial. *Journal of Child Psychology and Psychiatry*, 58(10), 1141–1151. <https://eric.ed.gov/?id=EJ1154623>.

Gallagher, P. A., Abbott-Shim, M., & VandeWiele, L. (2011). An evaluation of the Individualized Learning Intervention: A mentoring program for early childhood teachers. *NHSA Dialog*, 14(2), 57–74. <https://eric.ed.gov/?id=EJ922667>.

Gallingane, M. C. (2009). *Effects of read-aloud strategies on young children's vocabulary learning* (UMI No. 3385925) [Doctoral dissertation, University of Florida]. ProQuest Dissertations & Theses database.

Garnet, K. E. (1998). *Jumpstart: An evaluation of program efficacy for an intensive intervention with high-risk preschool children* (UMI No. 9810510) [Doctoral dissertation, University of Connecticut]. ProQuest Dissertations & Theses database.

Gettinger, M., & Stoiber, K. (2008). Applying a response-to-intervention model for early literacy development in low-income children. *Topics in Early Childhood Special Education*, 27(4), 198–213. <https://eric.ed.gov/?id=EJ796965>.

Gettinger, M., & Stoiber, K. C. (2014). Increasing opportunities to respond to print during storybook reading: Effects of evocative print-referencing techniques. *Early Childhood Research Quarterly*, 29(3), 283–297. <http://doi.org/10.1016/j.ecresq.2014.03.001>.

\*Gillis, M. B. (1998). *Evidence for the language basis of reading disabilities in preschool children* (UMI No. 9907066) [Doctoral dissertation, University of Louisville]. ProQuest Dissertations & Theses database.

Gingold, C. J. (2000). *A comparison of the impact of a computer based program with the impact of traditional instructional methods on emergent reading skills of prekindergarteners* (UMI No. 9965265) [Doctoral dissertation, Delta State University]. ProQuest Dissertations & Theses database.

Glynn County Schools. (2002). *Controlled study: Letter sound assessment-prekindergarten. Breakthrough to Literacy*.

Glynn County Schools. (2002). *Controlled study: Letter identification assessment-prekindergarten. Breakthrough to Literacy*.

Godfrey, J. B. (2014). *Using interactive reading techniques with Word World to enhance emergent literacy* (UMI No. 3663118) [Doctoral dissertation, Old Dominion University]. ProQuest Dissertations & Theses database.

\*Goldstein, H., Kelley, E., Greenwood, C., McCune, L., Carta, J., Atwater, J., Guerrero, G., McCarthy, T., Schneider, N., & Spencer, T. (2016). Embedded instruction improves vocabulary learning during automated storybook reading among high-risk preschoolers. *Journal of Speech, Language, and Hearing Research*, 59(3), 484–500. <https://eric.ed.gov/?id=ED577031>.

\*Goldstein, H., Olszewski, A., Haring, C., Greenwood, C. R., McCune, L., Carta, J., Atwater, J., Guerrero, G., Schneider, N., McCarthy, T., & Kelley, E. S. (2017). Efficacy of a supplemental phonemic awareness curriculum to instruct preschoolers with delays in early literacy development. *Journal of Speech, Language, and Hearing Research*, 60(1), 89–103. <https://eric.ed.gov/?id=ED577032>.

\*Gong, Z., & Levy, B. A. (2009). Four year old children's acquisition of print knowledge during electronic storybook reading. *Reading and Writing*, 22(8), 889–905. <https://eric.ed.gov/?id=EJ855305>.

Gonzalez, J. E., Pollard-Durodola, S., Simmons, D. C., Taylor, A. B., Davis, M. J., Kim, M., & Simmons, L. (2011). Developing low-income preschoolers' social studies and science vocabulary knowledge through content-focused shared book reading. *Journal of Research on Educational Effectiveness*, 4(1), 25–52. <https://eric.ed.gov/?id=EJ911536>.

Good, J. L. (2003). *Developing early literacy skills in young children with symptoms of inattention and hyperactivity* (UMI No. 3092743) [Doctoral dissertation, University of Minnesota]. ProQuest Dissertations & Theses database.

Grand Rapids, MI Preschool Work Sampling, 1997-1998. (2002). *The new three Rs: Research, reading, and results. Breakthrough to Literacy*. Wright Group/McGraw-Hill.

Grand Rapids Public Schools, Michigan Education Special Services Association. (1998). *Breakthrough to Literacy program evaluation*.

Greer, R. D., & Yuan, L. (2008). How kids learn to say the darnedest things: The effect of multiple exemplar instruction on the emergence of novel verb usage. *Analysis of Verbal Behavior*, 24(1), 103–121. <http://doi.org/10.1007/BF03393060>.

Griffith, P. L., Kimmel, S. J., & Biscoe, B. (2010). Teacher professional development for at-risk preschoolers: Closing the achievement gap by closing the instruction gap. *Action in Teacher Education*, 31(4), 41–53. <https://eric.ed.gov/?id=EJ915830>.

\*Guidry, L. O. (2003). *A phonological awareness intervention for at-risk preschoolers: The effects of supplemental, intensive, small-group instruction* (UMI No. 3098070) [Doctoral dissertation, Louisiana State University and Agricultural and Mechanical College]. ProQuest Dissertations & Theses database.

Gust, K. M. (2006). *The effects of professional development for early childhood educators on emergent literacy* (UMI No. 3209431) [Doctoral dissertation, Ball State University]. ProQuest Dissertations & Theses database.

\*Haley, A., Hulme, C., Bowyer-Crane, C., Snowling, M. J., & Fricke, S. (2017). Oral language skills intervention in pre-school—a cautionary tale. *International Journal of Language & Communication Disorders*, 52(1), 71–79. <http://doi.org/10.1111/1460-6984.12257>.

Hall, A. H. (2012). *Exploring the effectiveness of interactive writing in the Head Start preschool setting* (UMI No. 3579466) [Doctoral dissertation, University of Kentucky]. ProQuest Dissertations & Theses database.

Additional source: Hall, A. H., Toland, M. D., Grisham-Brown, J., & Graham, S. (2014). Exploring interactive writing as an effective practice for increasing Head Start students' alphabet knowledge skills. *Early Childhood Education Journal*, 42(6), 423–430. <https://eric.ed.gov/?id=EJ1043051>.

Hargrave, A. C., & Sénéchal, M. (2000). A book reading intervention with preschool children who have limited vocabularies: The benefits of regular reading and dialogic reading. *Early Childhood Research Quarterly*, 15(1), 75–90. <https://eric.ed.gov/?id=EJ633360>.

Harmon, M. T. (2009). *Use of computer assisted instruction to enhance the emergent literacy skills of at-risk preschoolers* (UMI No. 3371243) [Doctoral dissertation, Arizona State University]. ProQuest Dissertations & Theses database.

Harper, L. J. (2011). Nursery Rhyme knowledge and phonological awareness in preschool children. *Journal of Language and Literacy Education*, 7(1), 65–78. <https://eric.ed.gov/?id=EJ1097164>.

\*Harris, S. (2010). *Early intervention for poverty-stricken children: A study of preschoolers receiving Jumpstart* (UMI No. 3528245) [Doctoral dissertation, Illinois State University]. ProQuest Dissertations & Theses database.

Hartford Foundation for Public Giving. (2004). *Hartford children are learning by leaps and bounds: Achievements of children involved in Brighter Futures Child Care Enhancement Project*. <http://www.hartfordinfo.org/issues/wsd/education/bfi.pdf>.

Hassinger-Das, B., Ridge, K., Parker, A., Golinkoff, R. M., Hirsh-Pasek, K., & Dickinson, D. K. (2016). Building vocabulary knowledge in preschoolers through shared book reading and gameplay. *Mind, Brain, and Education*, 10(2), 71–80. <https://eric.ed.gov/?id=ED575955>.

Hatcher, P. J., Hulme, C., & Snowling, M. J. (2004). Explicit phoneme training combined with phonic reading instruction helps young children at risk of reading failure. *Journal of Child Psychology and Psychiatry*, 45(2), 338–358. <http://eric.ed.gov/?id=EJ951690>.

Hayles-Simmonds, D. (2012). *The effects of cooperative learning on preschoolers' literacy and social skills* (UMI No. 3499195) [Doctoral dissertation, Walden University]. ProQuest Dissertations & Theses database.

Headsprout Early Reading. (2007). Case study: NY students reading above grade level with Headsprout. In *Results count: Outcome data and case studies*.

Hilbert, D. D., & Eis, S. D. (2014). Early intervention for emergent literacy development in a collaborative community pre-kindergarten. *Early Childhood Education Journal*, 42(2), 105–113. <https://eric.ed.gov/?id=EJ1036155>.

Hindman, A. H., & Wasik, B. A. (2012). Unpacking an effective language and literacy coaching intervention in Head Start: Following teachers' learning over two years of training. *The Elementary School Journal*, 113(1), 131–154. <https://eric.ed.gov/?id=EJ992905>.

Hindman, A. H., & Wasik, B. A. (2017). Is dosage important? Examining Head Start preschoolers' language and literacy learning after one versus two years of ExCELL. *Early Child Development and Care*, 187(3-4), 342–357. <https://eric.ed.gov/?id=EJ1132331>.

\*Hong, S. Y., & Diamond, K. E. (2012). Two approaches to teaching young children science concepts, vocabulary, and scientific problem-solving skills. *Early Childhood Research Quarterly*, 27(2), 295–305. <https://eric.ed.gov/?id=EJ958051>.

\*Hsin, Y. W. (2007). *Effects of phonological awareness instruction on pre-reading skills of preschool children at-risk for reading disabilities* [Doctoral dissertation, The Ohio State University]. Retrieved November 29, 2018, from <https://etd.ohiolink.edu/>.

Humphrey, K., & Olivier, A. (2014). Investigating the impact of teenage mentors on pre-school children's development: A comparison using control groups. *Children and Youth Services Review*, 44(1), 20–24. <http://doi.org/10.1016/j.childyouth.2014.05.018>.

Hunt, A. (2012). *"Have you brought your singing voice?" An investigation into whether a small group singing intervention can improve phonological discrimination in young children* [Doctoral dissertation, Cardiff University]. Retrieved January 16, 2019, from <https://orca.cf.ac.uk/38789/>.

Hurry, J., Sylva, K., & Riley, J. (1999). Evaluation of a focused literacy teaching programme in reception and year 1 classes: Child outcomes. *British Educational Research Journal*, 25(5), 637–649. <https://eric.ed.gov/?id=EJ627241>.

Additional source: Sylva, K., Hurry, J., Mirelman, H., Burrell, A., & Riley, J. (1999). Evaluation of a focused literacy teaching programme in reception and year 1 classes: Classroom observations. *British Educational Research Journal*, 25(5), 617–635. <https://eric.ed.gov/?id=EJ627240>.

Hurtig, R., & Layzer, C. (2007). *CLIMBERs second year implementation report*. In IES annual performance report.

Hutinger, P., Bell, C., Daytner, G., & Johanson, J. (2005). *Disseminating and replicating an effective emerging literacy technology curriculum: A final report*. Center for Best Practices in Early Childhood Education. <https://eric.ed.gov/?id=ED489575>.

Additional source: Hutinger, P. L., Bell, C., Daytner, G., & Johanson, J. (2006). Establishing and maintaining an early childhood emergent literacy technology curriculum. *Journal of Special Education Technology*, 21(4), 39–54. <https://eric.ed.gov/?id=EJ767737>.

Irlen, S. M. (2003). *The impact of video viewing and retelling on preliterate children's narrative comprehension* (UMI No. 3088967) [Doctoral dissertation, University of California Los Angeles]. ProQuest Dissertations & Theses database.

Isbell, R., Sobol, J., Lindauer, L., & Lowrance, A. (2004). The effects of storytelling and story reading on the oral language complexity and story comprehension of young children. *Early Childhood Education Journal*, 32(3), 157–163. <https://eric.ed.gov/?id=EJ732281>.

Jackson, B., Larzelere, R., St. Clair, L., Corr, M., Fichter, C., & Egertson, H. (2006). The impact of HeadsUp! Reading on early childhood educators' literacy practices and preschool children's literacy skills. *Early Childhood Research Quarterly*, 21(2), 213–226. <https://eric.ed.gov/?id=EJ739014>.

Jaskolski, J. E. (2013). *Effects of phonological awareness training on early childhood educators' knowledge, instructional practice, and student outcomes* (UMI No. 3589448) [Doctoral dissertation, Cardinal Stritch University]. ProQuest Dissertations and Theses database.

Johanson, M., & Arthur, A. M. (2016). Improving the language skills of pre-kindergarten students: Preliminary impacts of the Let's Know! Experimental curriculum. *Child & Youth Care Forum*, 45(3) 367–392. <https://eric.ed.gov/?id=ED566376>.

Johnson, C. (2015). *Concepts about print and literacy skill acquisition of preschool students* (Order No. 3719069) [Doctoral dissertation, Walden University]. ProQuest Dissertations and Theses database.

\*Justice, L. M. (2000). *An experimental evaluation of an intervention to stimulate written language awareness in preschool children from low-income households* (UMI No. 9980417) [Doctoral dissertation, Ohio University]. ProQuest Dissertations and Theses database.

Additional source: Justice, L. M., & Ezell, H. K. (2002). Use of storybook reading to increase print awareness in at-risk children. *American Journal of Speech-Language Pathology*, 11(1), 17–29. [http://doi.org/10.1044/1058-0360\(2002/003\)](http://doi.org/10.1044/1058-0360(2002/003)).

Justice, L. (2002). Word exposure conditions and preschoolers' novel word learning during shared storybook reading. *Reading Psychology*, 23(2), 87–106. <https://eric.ed.gov/?id=EJ648581>.

\*Justice, L. M., Chow, S. M., Capellini, C., Flanigan, K., & Colton, S. (2003). Emergent literacy intervention for vulnerable preschoolers. *American Journal of Speech-Language Pathology*, 12(3), 320–332. [http://doi.org/10.1044/1058-0360\(2003/078\)](http://doi.org/10.1044/1058-0360(2003/078)).

Justice, L. M., Logan, J. A. R., Kadervaek, J. N., & Dynia, J. M. (2015). Print-focused read-alouds in early childhood special education programs. *Exceptional Children*, 81(3), 292–311. <https://eric.ed.gov/?id=EJ1055246>.

Justice, L. M., Mashburn, A., Pence, K. L., & Wiggins, A. (2008). Experimental evaluation of a preschool language curriculum: Influence on children's expressive language skills. *Journal of Speech, Language, and Hearing Research*, 51(4), 983–1001. [http://doi.org/10.1044/1092-4388\(2008/072\)](http://doi.org/10.1044/1092-4388(2008/072)).

Justice, L. M., McGinty, A. S., Cabell, S. Q., Kilday, C. R., Knighton, K., & Huffman, G. (2010). Language and literacy curriculum supplement for preschoolers who are academically at risk: A feasibility study. *Language, Speech, and Hearing Services in Schools*, 41(2), 161–178. <https://eric.ed.gov/?id=EJ887632>.

\*Justice, L. M., McGinty, A. S., Piasta, S. B., Kaderavek, J. N., & Fan, X. (2010). Print-focused read-alouds in preschool classrooms: Intervention effectiveness and moderators of child outcomes. *Language, Speech, and Hearing Services in Schools*, 41(4), 504–520. <https://eric.ed.gov/?id=EJ909127>.

Additional source: Hart, S. A., Piasta, S. B., & Justice, L. M. (2016). Do children's learning-related behaviors moderate the impacts of an empirically-validated early literacy intervention? *Learning and Individual Differences*, 50(1), 73–82. <http://doi.org/10.1016/j.lindif.2016.07.005>.

Additional source: McGinty, A. S., Breit-Smith, A., Fan, X., Justice, L. M., & Kaderavek, J. N. (2011). Does intensity matter? Preschoolers' print knowledge development within a classroom-based intervention. *Early Childhood Research Quarterly*, 26(3), 255–267. <https://eric.ed.gov/?id=EJ924086>.

Additional source: Justice, L. M., Kaderavek, J. N., Fan, X., Sofka, A., & Hunt, A. (2009). Accelerating preschoolers' early literacy development through classroom-based teacher-child storybook reading and explicit print referencing. *Language, Speech, and Hearing Services in Schools* 40(1), 67–85. <https://eric.ed.gov/?id=EJ825007>.

Additional source: Piasta, S. B., Justice, L. M., McGinty, A. S., & Kaderavek, J. N. (2012). Increasing young children's contact with print during shared reading: Longitudinal effects on literacy achievement. *Child Development*, 83(3), 810–820. <https://eric.ed.gov/?id=EJ965180>.

Kaiser, A., Dickinson, D., Roberts, M., Darrow, C., Freiberg, J., & Hofer, K. (2011, March). *The effects of two language-focused preschool curricula on children's achievement through first grade*. Paper presented at the Fourth Society for Research on Educational Effectiveness Conference, Washington, DC. <https://eric.ed.gov/?id=ED518192>.

Kaminski, R. A., & Powell-Smith, K. A. (2017). Early literacy intervention for preschoolers who need Tier 3 support. *Topics in Early Childhood Special Education*, 36(4), 205–217. <https://eric.ed.gov/?id=EJ1129310>.

Katsipataki, M. (2013). *Can motor skills training improve academic performance? A structured motor skills intervention for young children* (UMI No. 1651900430) [Doctoral dissertation, Durham University]. ProQuest Dissertations & Theses Global.

\*Kelley, E. S., Goldstein, H., Spencer, T. D., & Sherman, A. (2015). Effects of automated Tier 2 storybook intervention on vocabulary and comprehension learning in preschool children with limited oral language skills. *Early Childhood Research Quarterly*, 31(1), 47–61. <https://eric.ed.gov/?id=ED577028>.

\*Kelley, E. S., & Kinney, K. (2017). Word learning and story comprehension from digital storybooks: Does interaction make a difference? *Journal of Educational Computing Research*, 55(3), 410–428. <https://eric.ed.gov/?id=EJ1141523>.

Khan, K. Nelson, K., Whyte, E. (2014). Children choose their own stories: the impact of choice on children's learning of new narrative skills. *Journal of Child Language*, 41(4), 949–962. <http://doi.org/10.1017/S0305000913000160>.

Kidd, J. K., Pasnak, R., Curby, T. W., Ferhat, C. B., Gadzichowski, K. M., Gallington, D. A., & Machado, J. (2010, March). *Cognitive underpinnings of preschool literacy and numeracy*. Paper presented at the Third Annual Society for Research on Educational Effectiveness Conference, Washington, DC. <https://eric.ed.gov/?id=ED512662>.

Additional source: Kidd, J. K., Curby, T. W., Boyer, C. E., Gadzichowski, K. M., Gallington, D. A., Machado, J. A., & Pasnak, R. (2012). Benefits of an intervention focused on oddity and seriation. *Early Education & Development*, 23(6), 900–918. <https://eric.ed.gov/?id=EJ981625>.

Kim, H. W. (1997). *Effect of independent reading time in day care classrooms* (Order No. 9840313) [Doctoral dissertation, The University of Tennessee, Knoxville]. ProQuest Dissertations & Theses Global.

Kim, Y. G., & Phillips, B. (2016). Five minutes a day to improve comprehension monitoring in oral language contexts: An exploratory intervention study with prekindergarteners from low-income families. *Topics in Language Disorders*, 36(4), 356–367. <https://eric.ed.gov/?id=ED575735>.

Kinder, K. A. (2011). *Comparing the effects of descriptive comments versus descriptive comments plus prompted trials on children's letter naming* (UMI No. 3442189) [Doctoral dissertation, Vanderbilt University]. ProQuest Dissertations and Theses database.

Kirk, E. W. (1999). *Dictation and dramatization of children's own stories: the effects on frequency of children's writing activity and development of children's print awareness* (UMI No. 9950364) [Doctoral dissertation, Ball State University]. ProQuest Dissertations and Theses database.

Kirk, S. M., Vizcarra, C. R., Looney, E. C., & Kirk, E. P. (2014). Using physical activity to teach academic content: A study of the effects on literacy in head start preschoolers. *Early Childhood Education Journal*, 42(3), 181–189. <https://eric.ed.gov/?id=EJ1036253>.

Klein, E. R., Geiss, D., Kushner, R., & Hill, D. (2003, April). *The early childhood inclusion support program: Incorporating discrete skills into comprehensive units for learning*. Paper presented at the Thirteen Annual American Educational Research Association Conference, Chicago, IL. <https://eric.ed.gov/?id=ED477634>.

Knuth, A. S. (2015). *Teaching 4 year-old kindergarten students to think-aloud as a means of measuring their listening comprehension: A feasibility study* (Order No. 3723424) [Doctoral dissertation, Cardinal Stritch University]. ProQuest Dissertations and Theses database.

Kong, N. Y. (2013). *The effectiveness of a supplemental pre-kindergarten vocabulary intervention* (UMI No. 3559085) [Doctoral dissertation, University of Kansas]. ProQuest Dissertations and Theses database.

Koutsoftas, A. D., Harmon, M. T., & Gray, S. (2009). The effect of Tier 2 intervention for phonemic awareness in a response-to-intervention model in low-Income preschool classrooms. *Language, Speech, and Hearing Services in Schools*, 40(2), 116–130. <https://eric.ed.gov/?id=EJ838183>.

\*Kruse, L. (2013). *Small groups, big gains: Efficacy of a tier 2 phonological awareness intervention with preschoolers using a multiple-baseline design* (UMI No. 3673735) [Doctoral dissertation, The Ohio State University]. ProQuest Dissertations and Theses database.

Additional source: Kruse, L. G., Spencer, T. D., Olszewski, A., & Goldstein, H. (2015). Small groups, big gains: Efficacy of a tier 2 phonological awareness intervention with preschoolers with early literacy deficits. *American Journal of Speech-Language Pathology*, 24(2), 189–205. <https://eric.ed.gov/?id=ED577029>.

Kuamoo, M. (2008). *An evaluation of quality in early education: The role of curriculum and teacher-child outcomes* (UMI No. 3310906) [Doctoral dissertation, Capella University]. ProQuest Dissertations and Theses database.

Lafferty, A. E., Gray, S., & Wilcox, M. J. (2005). Teaching alphabetic knowledge to pre-school children with developmental language delay and with typical language development. *Journal of Child Language Teaching and Therapy*, 21(3), 263–277. <https://eric.ed.gov/?id=EJ751619>.

Laing, S. P., & Espeland, W. (2005). Low intensity phonological awareness training in a preschool classroom for children with communication impairments. *Journal of Communication Disorders*, 38(1), 65–82. <https://eric.ed.gov/?id=EJ731774>.

\*Lane, C., Prokop, M. J. S., Johnson, E., B., Podhajski, & Nathan, J. (2014). Promoting early literacy through the professional development of preschool teachers. *Early Years*, 34(1), 67–80. <https://eric.ed.gov/?id=EJ1024475>.

\*Langan, R. (2010). *Reducing the synonym effect: The impact of increased engagement on children's word learning during book reading* (UMI No. 1483531) [Master's thesis, Villanova University]. ProQuest Dissertations and Theses database.

Additional source: Blewitt, P., & Langan, R. (2016). Learning words during shared book reading: The role of extratextual talk designed to increase child engagement. *Journal of Experimental Child Psychology*, 150(1), 404–410. <http://doi.org/10.1016/j.jecp.2016.06.009>.

Language and Reading Research Consortium, Arthur, A. M., & Davis, D. L. (2016). A pilot study of the impact of double-dose robust vocabulary instruction on children's vocabulary growth. *Journal of Research on Educational Effectiveness*, 9(2), 173–200. <https://eric.ed.gov/?id=EJ1096950>.

Language and Reading Research Consortium, Jiang, H., & Davis, D. (2017). Let's know! Proximal impacts on prekindergarten through grade 3 students' comprehension-related skills. *The Elementary School Journal*, 118(2), 177–206. <https://eric.ed.gov/?id=EJ1162540>.

Lawson, L. A. (2013). *A response to intervention model for prekindergarten to increase school readiness* (UMI No. 3613022) [Doctoral dissertation, University of Delaware]. ProQuest Dissertations and Theses database.

Lechago, S. A., Carr, J. E., Kisamore, A. N., & Grow, L. L. (2015). The effects of multiple exemplar instruction on the relation between listener and intraverbal categorization repertoires. *The Analysis of Verbal Behavior*, 31(1), 76–95. <https://eric.ed.gov/?id=EJ1062551>.

Lee, S. G. (1999). *Intervention strategies to enhance phonological ability in preschool age children* (UMI No. 1399401) [Master's thesis, Southwest State University]. ProQuest Dissertations and Theses database.

\*Lee, W., & Pring, T. (2016). Supporting language in schools: Evaluating an intervention for children with delayed language in the early school years. *Child Language Teaching and Therapy*, 32(2), 135–146. <https://eric.ed.gov/?id=EJ1103212>.

Legg, V. A. (2005). *Early screening for potential literacy difficulties and intervening in nursery/reception* (UMI No. U5944B8) [Doctoral dissertation, University College, London]. ProQuest Dissertations and Theses database.

\*Leung, C. B. (2008). Preschoolers' acquisition of scientific vocabulary through repeated read-aloud events, retellings, and hands-on science activities. *Reading Psychology*, 29(2), 165–193. <https://eric.ed.gov/?id=EJ790593>.

\*Lima, O. K. A. (2008). *Proximal processes in preschoolers' word learning from classroom storybook sessions: Effects of teacher elaboration and child attention* (UMI No. 3362854) [Doctoral dissertation, University of Virginia]. ProQuest Dissertations and Theses database.

Linebarger, D. L., & Piotrowski, J. T. (2009). TV as storyteller: How exposure to television narratives impacts at-risk preschoolers' story knowledge and narrative skills. *British Journal of Developmental Psychology*, 27(1), 47–69. <https://eric.ed.gov/?id=EJ874496>.

\*Lonigan, C. J., Anthony, J. L., Bloomfield, B. G., Dyer, S. M., & Samwel, C. S. (1999). Effects of two shared-reading interventions on emergent literacy skills of at-risk preschoolers. *Journal of Early Intervention*, 22(4), 306–322. <http://doi.org/10.1177/105381519902200406>.

\*Lonigan, C. J., Driscoll, K., Phillips, B. M., Cantor, B. G., Anthony, J. L., & Goldstein, H. (2003). A computer-assisted instruction phonological sensitivity program for preschool children at-risk for reading problems. *Journal of Early Intervention*, 25(4), 248–262. <https://eric.ed.gov/?id=EJ674627>.

\*Lonigan, C. J., Farver, J. M., Phillips, B. M., & Clancy-Menchetti, J. (2011). Promoting the development of preschool children's emergent literacy skills: A randomized evaluation of a literacy-focused curriculum and two professional development models. *Reading and Writing*, 24(3), 305–337. <https://eric.ed.gov/?id=EJ915825>.

Lonigan, C. J., & Phillips, B. M. (2012, March). *Comparing skills-focused and self-regulation focused preschool curricula: Impacts on academic and self-regulatory skills*. Paper presented at the Sixth Society for Research on Educational Effectiveness Conference, Washington, DC. <https://eric.ed.gov/?id=ED530178>.

\*Lonigan, C. J., Phillips, B. M., Clancy, J. L., Landry, S. H., Swank, P. R., Assel, M., Taylor, H. B., Klein, A., Starkey, P., Domitrovich, C. E., Eisenberg, N., Villiers, J., Villiers, P., & Barnes, M. (2015). Impacts of a comprehensive school readiness curriculum for preschool children at risk for educational difficulties. *Child Development*, 86(6), 1773–1793. <https://eric.ed.gov/?id=EJ1079878>.

\*<sup>3</sup>Lonigan, C. J., & Phillips, B. M. (2016). Response to instruction in preschool: Results of two randomized studies with children at significant risk of reading difficulties. *Journal of Educational Psychology*, 108(1), 114–129. <https://eric.ed.gov/?id=EJ1086979>.

\*Lonigan, C. J., Purpura, D. J., Wilson, S. B., Walker, P. M., & Clancy-Menchetti, J. (2013). Evaluating the components of an emergent literacy intervention for preschool children at risk for reading difficulties. *Journal of Experimental Child Psychology*, 114(1), 111–130. <https://eric.ed.gov/?id=EJ1006636>.

Additional source: Lonigan, C. J. (2007). Vocabulary development and the development of phonological awareness skills in preschool children. In R. Wagner, A. E. Muse, & K. R. Tannenbaum (Eds.), *Vocabulary acquisition: Implications for reading comprehension* (pp. 15–31). The Guilford Press. <https://eric.ed.gov/?id=ED492062>.

Lonigan, C. J., & Whitehurst, G. J. (1998). Relative efficacy of parent and teacher involvement in a shared-reading intervention for preschool children from low-income backgrounds. *Early Childhood Research Quarterly*, 13(2), 263–290. <https://eric.ed.gov/?id=EJ574139>.

Lovelace, S., & Stewart, S. R. (2007). Increasing print awareness in preschoolers with language impairment using non-evocative print referencing. *Language, Speech & Hearing Services in Schools*, 38(1), 16–30. <https://eric.ed.gov/?id=EJ756208>.

\*Lovelace, T. S. (2008). *The effects of explicit phonological awareness instruction on the prereading skills of preschool children at risk for reading failure: Comparing single and multiple skill instructional strategies* [Doctoral dissertation, The Ohio State University]. Retrieved August 3, 2018, from <https://etd.ohiolink.edu/>.

Lust, C. A., & Donica, D. K. (2011). Effectiveness of a handwriting readiness program in Head Start: A two-group controlled trial. *American Journal of Occupational Therapy*, 65(5), 560–568. <http://doi.org/10.5014/ajot.2011.000612>.

\*Macaruso, P., & Rodman, A. (2011). Efficacy of computer-assisted instruction for the development of early literacy skills in young children. *Reading Psychology*, 32(2), 172–196. <https://eric.ed.gov/?id=EJ920179>.

MacKay, T., & Watson, K. (1999). Literacy, social disadvantage and early intervention: Enhancing reading achievement in primary school. *Educational and Child Psychology*, 16(1), 30–36. <https://login.proxy.lib.fsu.edu/login?url=https://search.proquest.com/docview/619421463?accountid=4840>.

<sup>3</sup> This manuscript includes two studies that were reviewed as separate studies. Both studies were rated as meeting the evidence standards.

Maczewski, A. L. (2012). *Handwriting without Tears®: Understanding the effects on cognitive and motor skill development* (UMI No. 1039651208) [Master's thesis, Southwest Minnesota State University]. ProQuest Dissertations & Theses Global.

\*Majsterrek, D. J., Shorr, D. N., & Erion, V. L. (2000). Promoting early literacy through rhyme detection activities during Head Start circle-time. *Child Study Journal*, 30(3), 143–143. <https://eric.ed.gov/?id=EJ626919>.

\*Mannes, T. J. (2013). *The effect of tier one literacy practices on preschoolers emergent literacy skills* (UMI No. 3591959) [Doctoral dissertation, Michigan State University]. ProQuest Dissertations and Theses database.

Marra, G. R. (2014). *Vocabulary growth using nonfiction literature and dialogic discussions in preschool classrooms* (UMI No. 3629795) [Doctoral dissertation, University of South Dakota]. ProQuest Dissertations and Theses database.

Martin, K., Emfinger, K., Snyder, S., & O'Neal, M. (2007). Results for year 2 of an Early Reading First project. *Journal of Research in Childhood Education*, 22(2), 125–140. <https://eric.ed.gov/?id=EJ929647>.

Martin, M. E., & Byrne, B. (2002). Teaching children to recognise rhyme does not directly promote phonemic awareness. *British Journal of Educational Psychology*, 72(4), 561–572. <http://doi.org/10.1348/00070990260377523>.

Maryland State Department of Education. (2015). *The association between Judy Center Services and kindergarten readiness*. <https://eric.ed.gov/?id=ED572303>.

Mashburn, A., Justice, L. M., McGinty, A., & Slocum, L. (2016). The impacts of a scalable intervention on the language and literacy development of rural pre-kindergartners. *Applied Developmental Science*, 20(1), 61–78. <https://eric.ed.gov/?id=EJ1086729>.

Maslanka, P., & Joseph, L. M. (2002). A Comparison of two phonological awareness techniques between samples of preschool children. *Reading Psychology*, 23(4), 271–288. <https://eric.ed.gov/?id=EJ658877>.

\*Massetti, G. M. (2009). Enhancing emergent literacy skills of preschoolers from low-income environments through a classroom-based approach. *School Psychology Review*, 38(4), 554–569. <https://eric.ed.gov/?id=EJ867982>.

Additional source: Massetti, G. M. (2002). *Dynamic assessment as an intervention for emergent literacy in Head Start* (UMI No. 3077745) [Doctoral dissertation, State University of New York at Stony Brook]. ProQuest Dissertations and Theses database.

Maxwell, K., Bryant, D., & Miller-Johnson, S. (1999). *A six-county study of the effects of Smart Start child care on kindergarten entry skills*. University of North Carolina at Chapel Hill, Frank Porter Graham Center. <https://eric.ed.gov/?id=ED433154>.

Maxwell, M. (2010). *Effects of the Pre-K Handwriting Without Tears® program on handwriting readiness skills of preschoolers with pre-writing deficits in a rural eastern North Carolina Head Start program* (UMI No. 840545123) [Master's thesis, East Carolina University]. ProQuest Dissertations & Theses Global.

McCabe, A., Boccia, J., Bennett, M. B., Lyman, N., & Hagen, R. (2010). Improving oral language and literacy skills in preschool children from disadvantaged backgrounds: Remembering, writing, reading (RWR). *Imagination, Cognition and Personality*, 29(4), 363–390. <http://doi.org/10.2190/IC.29.4.f>.

McCollom, P. (2000). *Effects of phonemic awareness training and the influence of phonemic skills on early reading success with pre-school and kindergarten children* (UMI No. 3030634) [Doctoral dissertation, Howard University]. from ProQuest Dissertations and Theses database.

McGeown, S. P., Johnston, R. S., & Medford, E. (2012). Reading instruction affects the cognitive skills supporting early reading development. *Learning and Individual Differences*, 22(3), 360–364. <https://eric.ed.gov/?id=EJ971825>.

McGivern, R. F., Hilliard, V. R., Anderson, J., Reilly, J. S., Rodriguez, A., Fielding, B., & Shapiro, L. (2007). Improving preliteracy and premath skills of Head Start children with classroom computer games. *Early Childhood Services: An Interdisciplinary Journal of Effectiveness*, 1(1), 71–81. <http://curriculumtechnologies.com/files/kinder-game-research.pdf>.

McGuinness, C., Sproule, L., Bojke, C., Trew, K., & Walsh, G. (2014). Impact of a play-based curriculum in the first two years of primary school: Literacy and numeracy outcomes over seven years. *British Educational Research Journal*, 40(5), 772–795. <https://eric.ed.gov/?id=EJ1043600>.

McIntosh, B., Crosbie, S., Holm, A., Dodd, B., & Thomas, S. (2007). Enhancing the phonological awareness and language skills of socially disadvantaged preschoolers: An interdisciplinary programme. *Child Language Teaching and Therapy*, 23(3), 267–286. <https://eric.ed.gov/?id=EJ775704>.

Additional source: O'Connor, M., Arnott, W., McIntosh, B., & Dodd, B. (2009). Phonological awareness and language intervention in preschoolers from low socio-economic backgrounds: A longitudinal investigation. *British Journal of Developmental Psychology*, 27(4), 767–782. <https://eric.ed.gov/?id=EJ879358>.

McLaclan, C., & Arrow, A. (2014). Promoting alphabet knowledge and phonological awareness in low socioeconomic child care settings: A quasi experimental study in five New Zealand centers. *Reading and Writing*, 27(5), 819–839. <https://eric.ed.gov/?id=EJ1038888>.

\*McLeod, R. H., Hardy, J. K., & Kaiser, A. P. (2017). The effects of play-based intervention on vocabulary acquisition by preschoolers at risk for reading and language delays. *Journal of Early Intervention*, 39(2), 147–160. <https://eric.ed.gov/?id=EJ1140020>.

McManis, M. H., & McManis, L. D. (2016). Using a touch-based, computer-assisted learning system to promote literacy and math skills for low-income preschoolers. *Journal of Information Technology Education*, 15(1), 409–429. <https://eric.ed.gov/?id=EJ1113038>.

Meyers, C., McLaughlin, T. F., Derby, M., Weber, K. P., & Robison, M. (2015). The effects of “Handwriting without Tears®” on the handwriting skills of appropriate size, form, and tool for a four year-old boy with a developmental delay. *The Journal of Special Education Apprenticeship*, 4(2), 1–12. <https://eric.ed.gov/?id=EJ1127775>.

Miguel, C. F., Petursdottir, A. I., & Carr, J. E. (2005). The effects of multiple-tact and receptive-discrimination training on the acquisition of intraverbal behavior. *Analysis of Verbal Behavior*, 21(1), 27–41. <https://eric.ed.gov/?id=EJ846316>.

Mihai, A. (2015). *Enhancing early literacy teaching and learning in Head Start: The impact of a repeated book reading approach* (UMI No. 3703261) [Doctoral dissertation, Indiana University]. ProQuest Dissertations and Theses database.

\*Mincic, M. S. (2009). *Dialogic reading with emotion-laden storybooks: Intervention methods to enhance children's emergent literacy and social-emotional skills* (UMI No. 3364575) [Doctoral dissertation, George Mason University]. ProQuest Dissertations and Theses database.

Modica, A. N. (2009). *Using a play intervention to improve the skills of children with a language delay* (UMI No. 3341998) [Doctoral dissertation, University of Nebraska at Omaha]. ProQuest Dissertations and Theses database.

Moore, M. M. (2003). *Combining phonological awareness and explicit instructional practices for preschoolers in Head Start* (UMI No. 3106291) [Doctoral dissertation, The Pennsylvania State University]. ProQuest Dissertations and Theses database.

Morris, T., & Leavey, G. (2006). Promoting phonological awareness in nursery-aged children through a Sure Start Early Listening programme. *International Journal of Early Years Education*, 14(2), 155–168. <https://eric.ed.gov/?id=EJ737232>.

Mukerjee, J. (2002). *Promoting young children's literacy through teacher friendly book reading procedures* (UMI No. 3076105) [Doctoral dissertation, Kansas State University]. ProQuest Dissertations and Theses database.

Mulvey, N. (2014). *The effects of explicit story grammar instruction on the narrative skills of preschool children* (UMI No. 3680905) [Doctoral dissertation, Indiana State University]. ProQuest Dissertations and Theses database.

Murphy, M. M. (2007). *Enhancing print knowledge, phonological awareness, and oral language skills with at-risk preschool children in Head Start classrooms* (UMI No. 3271904) [Doctoral dissertation, The University of Nebraska-Lincoln]. ProQuest Dissertations and Theses database.

Murray-Ward, M. (2000). *EI Centrito interim grant report for the period of July 1, 1999 to December 31, 1999* (Report No. 109). California Lutheran University, Educational Research and Leadership Institute.

Nancollis, A., Lawrie, B. A., & Dodd, B. (2005). Phonological awareness intervention and the acquisition of literacy skills in children from deprived social backgrounds. *Language, Speech, and Hearing Services in Schools*, 36(4), 325–335. <https://eric.ed.gov/?id=EJ741301>.

\*Nelson, J. R., Sanders, E. A., & Gonzalez, J. (2009). The efficacy of supplemental early literacy instruction by community-based tutors for preschoolers enrolled in Head Start. *Journal of Research on Educational Effectiveness*, 3(1), 1–25. <https://eric.ed.gov/?id=EJ877224>.

Nelson, S. D. (2016). *The effects of an integrated rhythmic and literacy intervention on the development of phonological awareness and rhythm skills of preschoolers* (Order No. 10246496) [Doctoral dissertation, Iowa State University]. ProQuest Dissertations and Theses database.

Neuman, S. B. (1999). Books make a difference: A study of access to literacy. *Reading Research Quarterly*, 34(3), 286–311. <https://eric.ed.gov/?id=EJ587549>.

Additional source: Black, L. (2001). *Effects of the Books Aloud Program on preschool children's narrative competence* (UMI No. 3031500) [Doctoral dissertation, Temple University]. ProQuest Dissertations and Theses database.

\*Neuman, S. B. (2017). The information book flood: Is additional exposure enough to support early literacy development? *The Elementary School Journal*, 118(1), 1–27. <https://eric.ed.gov/?id=EJ1162722>.

Neuman, S. B., & Dwyer, J. (2011). Developing vocabulary and conceptual knowledge for low-income preschoolers: A design experiment. *Journal of Literacy Research*, 43(2), 103–129. <https://eric.ed.gov/?id=EJ950695>.

Neuman, S. B., Kaefer, T., & Pinkham, A. M. (2016). Improving low-income preschoolers' word and world knowledge. *The Elementary School Journal*, 116(4), 652–674. <https://eric.ed.gov/?id=EJ1103949>.

Neuman, S. B., Newman, E. H., & Dwyer, J. (2011). Educational effects of a vocabulary intervention on preschoolers' word knowledge and conceptual development: A cluster-randomized trial. *Reading Research Quarterly*, 46(3), 249–272. <https://eric.ed.gov/?id=EJ935112>.

\*Neuman, S. B., Pinkham, A., & Kaefer, T. (2015). Supporting vocabulary teaching and learning in prekindergarten: The role of educative curriculum materials. *Early Education and Development*, 26(7), 988–1011. <https://eric.ed.gov/?id=EJ1070888>.

\*Neumann, M. M., Hood, M., & Ford, R. M. (2013). Using environmental print to enhance emergent literacy and print motivation. *Reading and Writing*, 26(5), 771–793. <https://eric.ed.gov/?id=EJ1000168>.

New Haven Public Schools. *Controlled study: Concepts about print assessment-entering kindergarten, Fall 2002*. Breakthrough to Literacy.

Nicolopoulou, A. (2002). Peer-group culture and narrative development. In S. Blum-Kulka & C. E. Snow (Eds.), *Talking to adults: The contribution of multiparty discourse to language acquisition* (pp. 117–152). Erlbaum.

Nicolopoulou, A., de Sá, A. B., Ilgaz, H., & Brockmeyer, C. (2009). Using the transformative power of play to educate hearts and minds: From Vygotsky to Vivian Paley and beyond. *Mind, Culture, and Activity*, 17(1), 42–58. <https://eric.ed.gov/?id=EJ910725>.

Additional source: Nicolopoulou, A., Cortina, K. S., Ilgaz, H., Cates, C. B., & de Sá, A. B. (2015). Using a narrative-and play-based activity to promote low-income preschoolers' oral language, emergent literacy, and social competence. *Early Childhood Research Quarterly*, 31(2), 147–162. <http://doi.org/10.1016/j.ecresq.2015.01.006>.

\*Noe, S., Spencer, T. D., Kruse, L., & Goldstein, H. (2014). Effects of a tier 3 phonological awareness intervention on preschoolers' emergent literacy. *Topics in Early Childhood Special Education*, 34(1), 27–39. <https://eric.ed.gov/?id=EJ1022226>.

Noel, M. J. (2013). *Does medium matter? increasing preschoolers' vocabulary during shared storybook reading using electronic and print formats* (Order No. 1542566) [Master's thesis, Western Carolina University]. ProQuest Dissertations and Theses database.

Nolan, J. P. (2016). *Implementation of iPads for at-risk pre-kindergarten students* (Order No. 10139651) [Doctoral dissertation, Concordia University–Chicago]. ProQuest Dissertations and Theses database.

Notari-Syverson, A. (1999). *Supporting early literacy development in young children with disabilities: A comprehensive interactive emergent literacy curriculum for preschoolers* (Final report to the U.S. Department of Education). Washington Research Institute.

Nuspl, J. J. (2006). *An investigation of teaching phonemic awareness to preschoolers with and without prior syllable instruction* (UMI No. EP25471) [Master's thesis, University of Wyoming]. ProQuest Dissertations and Theses database.

\*O'Leary, R. (2017). *Do spellings of words and phonemic awareness training facilitate vocabulary learning in preschoolers?* (Order No. 10275850) [Doctoral dissertation, The City University of New York]. ProQuest Dissertations and Theses database.

\*Olszewski, A. (2015). *Modeling alphabet skills as instructive feedback within a phonological awareness curriculum* (Order No. 3738434) [Doctoral dissertation, University of South Florida]. ProQuest Dissertations and Theses database.

Additional source: Olszewski, A., Soto, X., & Goldstein, H. (2017). Modeling alphabet skills as instructive feedback within a phonological awareness intervention. *American Journal of Speech-Language Pathology*, 26(3), 769–790. <https://eric.ed.gov/?id=ED577034>.

Onchwari, G., & Keengwe, J. (2010). Teacher mentoring and early literacy learning: A case study of a mentor-coach initiative. *Early Childhood Education Journal*, 37(4), 311–317. <https://eric.ed.gov/?id=EJ867591>.

Osley, K. R. (2009). *A head start in reading for children in a Head Start preschool program* (UMI No. 1472594) [Master's thesis, University of North Texas]. ProQuest Dissertations and Theses database.

Pacchiano, D. M., Whalen, S. P., Horsley, H. L., & Parkinson, K. (2016, March). *Efficacy study of a professional development intervention to strengthen organizational conditions and effective teaching in early education settings*. Paper presented at the Society for Research on Educational Effectiveness Spring 2016 Conference, Washington, DC. <https://eric.ed.gov/?id=ED567221>.

Paciga, K. A. (2011). *Preschoolers' listening comprehension of digital storybooks* [Doctoral dissertation]. <https://indigo.uic.edu/handle/10027/8305>.

Palmisano, L. A. (2010). *Effects of phonological awareness and print referencing treatment programs on the early literacy skills of preschool children with language impairments* (UMI No. 1479500) [Master's thesis, William Paterson University of New Jersey]. ProQuest Dissertations and Theses database.

\*Palmriter, A. B. W. (2013). *The effects of adult scaffolding and child executive functioning skills on vocabulary learning during shared book reading* (UMI No. 3585307) [Doctoral dissertation, University of Notre Dame]. ProQuest Dissertations and Theses database.

\*Patchan, M. M., & Puranik, C. S. (2016). Using tablet computers to teach preschool children to write letters: Exploring the impact of extrinsic and intrinsic feedback. *Computers & Education*, 102(1), 128–137. <http://doi.org/10.1016/j.compedu.2016.07.007>.

Paulson, L. H., Kelly, K. L., Jepson, S., van den Pol, R., Ashmore, R., Farrier, M., & Guilfoyle, S. (2003). The effects of an early reading curriculum on language and literacy development of Head Start children. *Journal of Research in Childhood Education*, 18(3), 169–178. <https://eric.ed.gov/?id=EJ751923>.

Additional source: Van den Pol, R. (2003). *The Montana Early Literacy Project—building language and literacy skills during the early childhood years: Preparing children with disabilities for success in early elementary school*. Montana University, Missoula Division of Educational Research and Services. <https://eric.ed.gov/?id=ED477973>.

Pederson, T. N. (2017). *Implementing a five-week summer program as an intervention to kindergarten readiness* (Order No. 10272703) [Doctoral dissertation, University of South Dakota]. ProQuest Dissertations and Theses database.

Pelletier, J., Reeve, R., & Halewood, C. (2006). Young children's knowledge building and literacy development through Knowledge Forum. *Early Education and Development*, 17(3), 323–346. <https://eric.ed.gov/?id=EJ757522>.

\*Penuel, W. R., Bates, L., Gallagher, L. P., Pasnik, S., Llorente, C., Townsend, E., Hupert, N., Dominguez, X., & VanderBorgh, M. (2012). Supplementing literacy instruction with a media-rich intervention: Results of a randomized controlled trial. *Early Childhood Research Quarterly*, 27(1), 115–127. <https://eric.ed.gov/?id=EJ947504>.

Additional source: Penuel, W. R., Pasnik, S., Bates, L., Townsend, E., Gallagher, L. P., Llorente, C., & Hupert, N. (2009). *Preschool teachers can use a media-rich curriculum to prepare low-income children for school success: Results of a randomized controlled trial*. Education Development Center and SRI. <https://eric.ed.gov/?id=ED506950>.

Additional source: Penuel, W. R., Bates, L., Townsend, E., Gallagher, L. P., Pasnik, S., & Llorente, C. (2010, March). *A media-rich curriculum for improving early literacy outcomes of low-income children: Evaluation results for the "Ready to Learn" initiative*. Paper presented at the Third Society for Research on Educational Effectiveness Conference, Washington, DC. <https://eric.ed.gov/?id=ED512719>.

Petursdottir, A. I. (2006). *An evaluation of intraverbal training and listener training for teaching categorization skills* (UMI No. 3234887) [Doctoral dissertation, Western Michigan University]. ProQuest Dissertations and Theses database.

Petursdottir, A. I., Carr, J. E., & Michael, J. (2005). Emergence of mands and tacts of novel objects among preschool children. *The Analysis of Verbal Behavior*, 21(1), 59–74. <https://eric.ed.gov/?id=EJ846319>.

Phelps, S. (2003). *Phonological awareness training in a preschool classroom of typically developing children* (UMI No. 1413452) [Master's thesis, East Tennessee State University]. ProQuest Dissertations and Theses database.

Phillips, B. M. (2014). Promotion of syntactical development and oral comprehension: Development and initial evaluation of a small-group intervention. *Child Language Teaching and Therapy*, 30(1), 63–77. <https://eric.ed.gov/?id=EJ1019082>.

\*Phillips, B. M., Tabulda, G., Ingrole, S. A., Burris, P. W., Sedgwick, T. K., & Chen, S. (2016). Literate language intervention with high-need prekindergarten children: A randomized trial. *Journal of Speech, Language, and Hearing Research*, 59(6), 1409–1420. <https://eric.ed.gov/?id=EJ1124170>.

Pianta, R., Hamre, B., Downer, J., Burchinal, M., Williford, A., LoCasale-Crouch, J., Howes, C., La Paro, K., & Scott-Little, C. (2017). Early childhood professional development: Coaching and coursework effects on indicators of children's school readiness. *Early Education & Development*, 28(8), 956–975. <https://eric.ed.gov/?id=EJ1154491>.

\*Piasta, S. B. (2008). *Developing emergent literacy skills: The impact of alphabet instruction* (UMI No. 3340751) [Doctoral dissertation, Florida State University]. ProQuest Dissertations and Theses database.

Additional source: Piasta, S. B., & Wagner, R. K. (2010). Learning letter names and sounds: Effects of instruction, letter type, and phonological processing skill. *Journal of Experimental Child Psychology*, 105(4), 324–344. <https://eric.ed.gov/?id=EJ876203>.

\*Pietrangelo, D. J. (1999). *Outcomes of an enhanced literacy curriculum on the emergent literacy skills of Head Start preschoolers* (UMI No. 9927614) [Doctoral dissertation, University at Albany, State University of New York]. ProQuest Dissertations and Theses database.

Podhajski, B., & Nathan, J. (2005). Promoting early literacy through professional development for childcare providers. *Early Education and Development*, 16(1), 1–5. <https://eric.ed.gov/?id=EJ757473>.

\*Pollard-Durodola, S. D., Gonzalez, J. E., Simmons, D. C., Kwok, O., Taylor, A. B., Davis, M. J., Kim, M., & Simmons, L. (2011). The effects of an intensive shared book-reading intervention for preschool children at risk for vocabulary delay. *Exceptional Children*, 77(2), 161–183. <https://eric.ed.gov/?id=EJ918889>.

Powell, D. R., Diamond, K. E., Burchinal, M. R., & Koehler, M. J. (2010). Effects of an early literacy professional development intervention on Head Start teachers and children. *Journal of Educational Psychology*, 102(2), 299–312. <https://eric.ed.gov/?id=EJ884844>.

\*Preschool Curriculum Evaluation Research Consortium. (2008a). Bright Beginnings and Creative Curriculum: Vanderbilt University. In *Effects of Preschool Curriculum Programs on School Readiness* (NCER No. 2008-2009). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.

Additional source: Lipsey, M. W., Farran, D. C., Hurley, S. M., Hofer, K. G., & Bilbrey, C. (2009, March). *Effects of a literacy focused curriculum and a developmental curriculum on school readiness and subsequent state achievement test outcomes in rural prekindergarten classrooms*. Paper presented at the Second Annuals Society for Research on Educational Effectiveness Conference, Washington, DC. <https://eric.ed.gov/?id=ED514947>.

\*Preschool Curriculum Evaluation Research Consortium. (2008b). Creative Curriculum: University of North Carolina at Charlotte. In *Effects of Preschool Curriculum Programs on School Readiness* (NCER No. 2008-2009). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.

\*Preschool Curriculum Evaluation Research Consortium. (2008c). Creative Curriculum with Ladders to Literacy: University of New Hampshire. In *Effects of Preschool Curriculum Programs on School Readiness* (NCER No. 2008-2009). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.

\*Preschool Curriculum Evaluation Research Consortium. (2008d). Curiosity Corner: Success for All Foundation. In *Effects of Preschool Curriculum Programs on School Readiness* (NCER No. 2008-2009) (pp. 75–83). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.

Preschool Curriculum Evaluation Research Consortium. (2008f). Early Literacy and Learning Model: University of North Florida. In *Effects of Preschool Curriculum Programs on School Readiness* (NCER No. 2008-2009) (pp. 99–108). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.

\*Preschool Curriculum Evaluation Research Consortium. (2008g). Language-Focused Curriculum: University of Virginia. In *Effects of Preschool Curriculum Programs on School Readiness* (NCER No. 2008-2009) (pp. 109-116). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.

\*Preschool Curriculum Evaluation Research Consortium. (2008h). Literacy Express and DLM Early Childhood Express Supplemented with Open Court Reading Pre-K: Florida State University. In *Effects of Preschool Curriculum Programs on School Readiness* (NCER 2008-2009) (pp. 117–130). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.

Additional source: Lonigan, C. J., Phillips, B. M., & Menchetti, J. C. (2006, July). *Impact of preschool literacy curricula: Results of a randomized trial*. Paper presented in the Thirteenth Annual Society for the Scientific Study of Reading Conference, Vancouver, British Columbia, Canada.

\*Preschool Curriculum Evaluation Research Consortium. (2008i). Project Approach: Purdue University/University of Wisconsin. In *Effects of Preschool Curriculum Programs on School Readiness* (NCER No. 2008-2009) (pp. 143–151). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.

Preschool Curriculum Evaluation Research Consortium. (2008j). Project Construct: University of Missouri-Columbia. In *Effects of Preschool Curriculum Programs on School Readiness* (NCER No. 2008-2009) (pp. 153–161). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.

Preschool Curriculum Evaluation Research Consortium. (2008k). Ready, Set, Leap!: University of California, Berkeley. In *Effects of Preschool Curriculum Programs on School Readiness* (NCER No. 2008-2009) (pp. 164–172). U.S. Department of Education, Institute of Education Sciences, National Center for Education Research.

\*Price-Mohr, R., & Price, C. (2017). Gender differences in early reading strategies: A comparison of synthetic phonics only with a mixed approach to teaching reading to 4–5 year-old children. *Early Childhood Education Journal*, 45(5), 613–620. <http://doi.org/10.1007/s10643-016-0813-y>.

Rahn, N. L. (2013). *A comparison of word learning in 3-year-old children at-risk for language and literacy difficulties in two conditions: Dialogic reading and activity-based intervention* (UMI No. 3567464) [Doctoral dissertation, University of Minnesota]. ProQuest Dissertations and Theses database.

Raisner, J. C. (2002). *The effect of rhythmic music activities upon language acquisition with four -year -old children* (UMI No. 276061300) [Doctoral dissertation, Temple University]. ProQuest Dissertations & Theses Global.

Raisor, L. J. (2006). *A comparison of phonological awareness intervention approaches* (UMI No. 3217598) [Doctoral dissertation, University of Cincinnati]. ProQuest Dissertations and Theses database.

Rasberry, J. E. (2004). *Early childhood literacy enrichment training of teachers and of three and four year olds in a preschool setting* (UMI No. 3133955) [Doctoral dissertation, Mississippi State University]. ProQuest Dissertations and Theses database.

Razgunas, R. M. (2007). *Levels of abstraction in shared book-reading with Head Start preschoolers with speech-language impairment* (UMI No. 1449958) [Master's thesis, Wayne State University]. ProQuest Dissertations and Theses database.

Register, D. (2001). The effects of an early intervention music curriculum on prereading/writing. *Journal of Music Therapy*, 38(3), 239–248. <http://doi.org/10.1093/jmt/38.3.239>.

Riches, N. G., Tomasello, M., & Conti-Ramsden, G. (2005). Verb learning in children with SLI: Frequency and spacing effects. *Journal of Speech, Language, and Hearing Research*, 48(6), 1397–1411. <https://eric.ed.gov/?id=EJ742741>.

Riley, J., Burrell, A., & McCallum, B. (2004). Developing the spoken language skills of reception class children in two multicultural, inner-city primary schools. *British Educational Research Journal*, 30(5), 657–672. <https://eric.ed.gov/?id=EJ680385>.

Ritblatt, S., Longstreth, S., Hokoda, A., Cannon, B. N., & Weston, J. (2013). Can music enhance school-readiness socioemotional skills? *Journal of Research in Childhood Education*, 27(3), 257–266. <http://doi.org/10.1080/02568543.2013.796333>.

\*RMC Research Corporation. (2003). *Ready, Set, Leap! Program: Newark prekindergarten study 2002-2003 final report*.

Roskos, K. A., Sullivan, S., Simpson, D., & Zuzolo, N. (2016). E-books in the early literacy environment: Is there added value for vocabulary development? *Journal of Research in Childhood Education*, 30(2), 226–236. <https://eric.ed.gov/?id=EJ1094809>.

Roskos, K., & Burstein, K. (2011). Assessment of the design efficacy of a preschool vocabulary instruction technique. *Journal of Research in Childhood Education*, 25(3), 268–287. <https://eric.ed.gov/?id=EJ929310>.

Roth, F. P., Troia, G. A., Worthington, C. K., & Dow, K. A. (2002). Promoting awareness of sounds in speech: An initial report of an early intervention program for children with speech and language impairments. *Applied Psycholinguistics*, 23(4), 535–565. <http://doi.org/10.1017/S0142716402004034>.

Additional source: Roth, F. P., Troia, G. A., Worthington, C. K., & Handy, D. (2006). Promoting Awareness of Sounds in Speech (PASS): The effects of intervention and stimulus characteristics on the blending performance of preschool children with communication impairments. *Learning Disability Quarterly*, 29(2), 67–88. <https://eric.ed.gov/?id=EJ786197>.

\*Russell, J. (2005). *An investigation of preschool oral language improvements through Ladders to Literacy* [Unpublished doctoral dissertation, University of New Hampshire].

\*Ruston, H. P., & Schwanenflugel, P. J. (2010). Effects of a conversation intervention on the expressive vocabulary development of prekindergarten children. *Language, Speech, and Hearing Services in Schools*, 41(3), 303–313. <https://eric.ed.gov/?id=EJ892596>.

\*Sa, A. (2012). *Fostering preschoolers' narrative comprehension through inference making and story reenactment training* (UMI No. 3542680) [Doctoral dissertation, LeHigh University]. ProQuest Dissertations and Theses database.

Salaway, J. L. (2008). *Efficacy of a direct instruction approach to promote early learning* (UMI No. 3303027) [Doctoral dissertation, Duquesne University]. ProQuest Dissertations and Theses database.

Schryer, E., Sloat, E., & Letourneau, N. (2015). Effects of an animated book reading intervention on emergent literacy skill development: An early pilot study. *Journal of Early Intervention*, 37(2), 155–171. <http://doi.org/10.1177/1053815115598842>.

\*Schwanenflugel, P. J., Hamilton, C. E., Neuharth-Pritchett, S., Restrepo, M. A., Bradley, B. A., & Webb, M. Y. (2010). PAVEd for success: An evaluation of a comprehensive preliteracy program for four-year-old children. *Journal of Literacy Research*, 42(3), 227–275. <https://eric.ed.gov/?id=EJ897192>.

\*Scott, D. D. (2005). *Investigating the behavioral outcomes of an early literacy intervention for at-risk preschool children* (UMI No. 3177496) [Doctoral dissertation, University of Virginia]. ProQuest Dissertations and Theses database.

Senechal, M. (1997). The differential effect of storybook reading on preschoolers' acquisition of expressive and receptive vocabulary. *Journal of Child Language*, 24(1), 123–138. <https://eric.ed.gov/?id=EJ547516>.

Shaller, G. E. (2005). *Teaching and tracking emergent literacy instruction in head start* (UMI No. 305366129) [Doctoral dissertation, Stony Brook University]. ProQuest Dissertations & Theses Global.

\*Sheldon, K. M. (1997). *Effects of a milieu teaching strategy in a storybook context on the acquisition, maintenance, and generalization of expressive language by young children with developmental disabilities* (Order No. 9801786) [Doctoral dissertation, The Ohio State University]. ProQuest Dissertations and Theses database.

Shute, R., & Miksad, J. (1997). Computer assisted instruction and cognitive development in preschoolers. *Child Study Journal*, 27(3), 237–253. <https://eric.ed.gov/?id=EJ554378>.

Small, S. (2013). *Will implementing a research based DESE approved early childhood program have an effect on the school readiness of prekindergarten students* (Order No. 3606176) [Doctoral dissertation, Lindenwood University]. ProQuest Dissertations and Theses database.

Smith, C., & Fluck, M. (2000). (Re-) Constructing pre-linguistic interpersonal processes to promote language development in young children with deviant or delayed communication skills. *British Journal of Educational Psychology*, 70(3), 369–389. <http://doi.org/10.1348/000709900158182>.

Smith, E. J., Pellin, B. J., & Agruso, S. A. (2003). Bright Beginnings: An effective literacy-focused PreK program for educationally disadvantaged four-year-old children. *Educational Research Service*, 1–104. <https://eric.ed.gov/?id=ED478648>.

Smith, R. (2015). *Assessing vocabulary of children: Investigating the evaluation and instruction of basic concepts* (UMI No. 1587241) [Master's thesis, University of Arkansas]. ProQuest Dissertations and Theses database.

\*Smith, S. H. (1998). *The effects of a whole language method of instruction and an integrated phonics method of instruction on the reading achievement of inner-city preschool pupils* (UMI No. 9826788) [Doctoral dissertation, The George Washington University]. ProQuest Dissertations and Theses database.

Standley, J., & Hughes, J. (1997). Evaluation of an early intervention music curriculum for enhancing pre-reading and writing skills. *Music Therapy Perspectives*, 15(2), 79–86. <http://doi.org/10.1093/mtp/15.2.79>.

\*Stanton-Chapman, T. L. (2004). *Building social communication skills during peer interaction using storybooks* (UMI No. 3127279) [Doctoral dissertation, Vanderbilt University]. ProQuest Dissertations and Theses database.

Additional source: Stanton-Chapman, T. L., Kaiser, A. P., & Wolery, M. (2006). Building social communication skills in Head Start children using storybooks: The effects of prompting on social interactions. *Journal of Early Intervention*, 28(3), 197–212. <https://eric.ed.gov/?id=EJ743116>.

\*Stanton-Chapman, T. L., Denning, C. B., & Jamison, K. R. (2012). Communication skill building in young children with and without disabilities in a preschool classroom. *The Journal of Special Education*, 46(2), 78–93. <https://eric.ed.gov/?id=EJ972255>.

Stanton-Chapman, T. L., Kaiser, A. P., Vijay, P., & Chapman, C. (2008). A multicomponent intervention to increase Peer-directed communication in Head Start children. *Journal of Early Intervention*, 30(3), 188–212. <https://eric.ed.gov/?id=EJ821302>.

Starnes, L. P. (2017). *Effects of social-emotional education on pre-kindergarten student academic achievement* (Order No. 10680463) [Doctoral dissertation, Liberty University]. ProQuest Dissertations and Theses database.

\*Stockard, J. (2009). *Promoting early literacy of preschool children: A study of the effectiveness of Funnix Beginning Reading* (Technical Report No. 2009-1). National Institute of Direct Instruction. <https://eric.ed.gov/?id=EJ908028>.

Storie, S., Coogler, C. G., Rahn, N., & Ottley, J. R. (2017). Distance coaching for pre-service teachers: Impacts on children's functional communication in inclusive preschool classrooms. *Early Childhood Education Journal*, 45(6), 735–743. <https://eric.ed.gov/?id=EJ1156735>.

Strand, P. S., & Cerna, S. (2010). The effects of a data dissemination strategy on the letter naming and object counting skills of preschoolers attending Head Start. *Journal of Behavioral Education*, 19(4), 289–305. <https://eric.ed.gov/?id=EJ907398>.

Syring, L. K. (2008). *Phoneme identity in preschool and its role in kindergarten reading readiness* (UMI No. 304836583) [Master's thesis, Southwest Minnesota State University]. ProQuest Dissertations & Theses Global.

\*Talley, S., Lancy, D. F., & Lee, T. R. (1997). Children, storybooks and computers. *Reading Horizons*, 38(2), 116–128. Retrieved March 13, 2018, from [https://scholarworks.wmich.edu/reading\\_horizons/vol38/iss2/7/](https://scholarworks.wmich.edu/reading_horizons/vol38/iss2/7/).

\*Thompson, P. S. (2015). *Scaffolding emergent literacy skills in pre-kindergarten through writing instruction* (UMI No. 3702167) [Doctoral dissertation, Middle Tennessee State University]. ProQuest Dissertations and Theses database.

\*Trotti, J., Hendricks, R., & Bledsoe, C. (2017). Emergent literacy development and computer assisted instruction. *SRATE Journal*, 26(1), 30–39. <https://eric.ed.gov/?id=EJ1134394>.

Tsitiridou-Evangelou, M. (2001). *Evaluation of the effects of a pre-school intervention on literacy development in children* [Unpublished doctoral dissertation, University of Oxford].

Tyler, A. A., Gillon, G., Macrae, T., & Johnson, R. L. (2011). Direct and indirect effects of stimulating phoneme awareness vs. other linguistic skills in preschoolers with co-occurring speech and language impairments. *Topics in Language Disorders*, 31(2), 128–144. <https://eric.ed.gov/?id=EJ927248>.

Additional source: Sweat, L. M. (2004). *Comparing the effects of morphosyntax and phonology intervention on final consonant clusters in finite morphemes and final consonant inventories* (UMI No. 1414481) [Master's thesis, University of Nevada, Reno]. ProQuest Dissertations and Theses database.

Additional source: Tyler, A. A., Lewis, K. E., Haskill, A., & Tolbert, L. C. (2002). Efficacy and cross-domain effects of a morphosyntax and a phonology intervention. *Language, Speech, and Hearing Services in Schools*, 33(1), 52–66. <https://eric.ed.gov/?id=EJ653786>.

Additional source: Tyler, A. A., Lewis, K. E., Haskill, A., & Paul, K. (2003). Effects of a cycled morphological intervention on selected suppletive BE forms. *Clinical Linguistics & Phonetics*, 17(1), 25–42. <http://doi.org/10.1080/0269920021000051517>.

\*Tyler, A. A., Lewis, K. E., Haskill, A., & Tolbert, L. C. (2003). Outcomes of different speech and language goal attack strategies. *Journal of Speech, Language, and Hearing Research*, 46(5), 1077–1094. <https://eric.ed.gov/?id=EJ823316>.

Additional source: Meyer, C. M. (2000). *The relationship of various predictors to phonological change following treatment* (UMI No. 1399579) [Master's thesis, University of Nevada, Reno]. ProQuest Dissertations and Theses database.

Tyler, A. A., Osterhouse, H., Wickham, K., Mcnutt, R., & Shao, Y. (2014). Effects of explicit teacher-implemented phoneme awareness instruction in 4-year-olds. *Clinical Linguistics & Phonetics*, 25(7-8), 493–507. <http://doi.org/10.3109/02699206.2014.927004>.

Ukrainetz, T. A., Nuspl, J. J., Wilkerson, K., & Beddes, S. R. (2011). The effects of syllable instruction on phonemic awareness in preschoolers. *Early Childhood Research Quarterly*, 26(1), 50–60. <https://eric.ed.gov/?id=EJ906814>.

Vajcner, T. (2015). *Dialogic reading using social-emotional themed storybooks: Impact on preschoolers' emergent literacy and emotion knowledge* (Order No. 10145267) [Doctoral dissertation, The Ohio State University]. ProQuest Dissertations and Theses database.

van Kleeck, A., Gillam, R. B., & McFadden, T. U. (1998). A study of classroom-based phonological awareness training for preschoolers with speech and/or language disorders. *American Journal of Speech-Language Pathology*, 7(3), 65–76. <http://doi.org/10.1044/1058-0360.0703.65>.

van Kleeck, A., Vander, W. J., & Hammett, L. (2006). Fostering literal and inferential language skills in Head Start preschoolers with language impairment using scripted book-sharing discussions. *American Journal of Speech-Language Pathology*, 15(1), 85–95. <https://eric.ed.gov/?id=EJ902765>.

Vasilyeva, M., Huttenlocher, J., & Waterfall, H. (2006). Effects of language intervention on syntactic skill levels in preschoolers. *Developmental Psychology*, 42(1), 164174. <https://eric.ed.gov/?id=EJ733858>.

Vatalaro, A., Culp, A. M., Hahs-Vaughn, D. L., & Barnes, A. C. (2015). A quasi-experiment examining expressive and receptive vocabulary knowledge of preschool Head Start children using mobile media apps. *Early Childhood Education Journal*, 46(4), 451–466. <https://eric.ed.gov/?id=EJ1181438>.

Vecchiotti, S. (2004). *Two-year program evaluation of the Jumpstart program in New York City* (UMI No. 3125031) [Doctoral dissertation, Fordham University]. ProQuest Dissertations and Theses database.

Vera, D. J. (2007). *The use of popular culture environmental print to increase the emergent literacy skills of prekindergarten children in one high-poverty urban school district* (UMI No. 3270408) [Doctoral dissertation, Texas A&M University]. ProQuest Dissertations and Theses database.

Additional source: Vera, D. (2011). Using popular culture print to increase emergent literacy skills in one high-poverty urban school district. *Journal of Early Childhood Literacy*, 11(3), 307–330. <https://eric.ed.gov/?id=EJ938739>.

Villaarrutia, A. (2004). *The effect of scaffolding on children's oral language development* (UMI No. 1423643) [Master's thesis, The University of Texas–Pan American]. ProQuest Dissertations and Theses database.

Wahlstrom, K., Hornbacher, J., & Rader, S. (2007). *Bloomington/Richfield—Early Reading First Get Ready Centers of Excellence year II report*. Center for Applied Research and Educational Improvement.

Waldron-Soler, K. M. (2001). *Effects of the "Language for Learning" curriculum on the receptive language, expressive language, and social interaction skills of preschoolers with and without disabilities* (UMI No. 3051947) [Doctoral dissertation, Washington State University]. ProQuest Dissertations and Theses database.

Additional source: Waldron-Soler, K. M., Martella, R. C., Marchand-Martella, N. E., Warner, D. A., Tso, M. E., Warner, D. A., & Miller, D. E. (2002). Effects of a 15-week Language for Learning implementation with children in an integrated preschool. *Journal of Direct Instruction*, 2(2), 75–86. <https://eric.ed.gov/?id=EJ651887>.

\*Walsh, B. (2009). *Novel word learning of preschoolers enrolled in Head Start regular and bilingual classrooms: Impact of adult vocabulary noneliciting questions during shared storybook reading* (UMI No. 3384573) [Doctoral dissertation, Texas Woman's University]. ProQuest Dissertations and Theses database.

Additional source: Walsh, B. A., & Rose, K. K. (2013). Impact of adult vocabulary noneliciting and eliciting questions on the novel vocabulary acquisition of preschoolers enrolled in Head Start. *Journal of Research in Childhood Education*, 27(1), 31–45. <https://eric.ed.gov/?id=ED530807>.

\*Walsh, B. A., & Blewitt, P. (2006). The effect of questioning style during storybook reading on novel vocabulary acquisition of preschoolers. *Early Childhood Education Journal*, 33(4), 273–278. <https://eric.ed.gov/?id=EJ747238>.

Wardi-Zonna, K. (1997). *The efficacy of early intervention with preschool children at multiple risk* (UMI No. 9822193) [Doctoral dissertation, State University of New York at Buffalo]. ProQuest Dissertations and Theses database.

\*Washington, K. N., Warr-Leeper, G., & Thomas-Stonell, N. (2011). Exploring the outcomes of a novel computer-assisted treatment program targeting expressive-grammar deficits in preschoolers with SLI. *Journal of Communication Disorders*, 44(3), 315–330. <https://eric.ed.gov/?id=EJ925765>.

Additional source: Washington, K. N., & Warr-Leeper, G. A. (2013). Visual support in intervention for preschoolers with specific language impairment. *Topics in Language Disorders*, 33(4), 347–365. <https://eric.ed.gov/?id=EJ1063095>.

Additional source: Washington, K. N. (2013). The association between expressive grammar intervention and social and emergent literacy outcomes for preschoolers with SLI. *American Journal of Speech-Language Pathology*, 22(1), 113–125. <https://eric.ed.gov/?id=EJ1005166>.

\*Wasik, B. A., & Bond, M. A. (2001). Beyond the pages of a book: interactive book reading and language development in preschool classrooms. *Journal of Educational Psychology*, 93(2), 243. <https://eric.ed.gov/?id=EJ638739>.

Wasik, B. A., & Hindman, A. H. (2011). Improving vocabulary and pre-literacy skills of at-risk preschoolers through teacher professional development. *Journal of Educational Psychology*, 103(2), 455–469. <https://eric.ed.gov/?id=EJ926124>.

Additional source: Wasik, B. A., & Hindman, A. H. (2014). Understanding the active ingredients in an effective preschool vocabulary intervention: An exploratory study of teacher and child talk during book reading. *Early Education and Development*, 25(7), 1035–1056. <https://eric.ed.gov/?id=EJ1033999>.

Wasik, B. A., Bond, M. A., & Hindman, A. (2006). The effects of a language and literacy intervention on Head Start children and teachers. *Journal of Educational Psychology*, 98(1), 63–74. <https://eric.ed.gov/?id=EJ734340>.

Weisberg, D. S., Ilgaz, H., Hirsh-Pasek, K., Golinkoff, R., Nicolopoulou, A., & Dickinson, D. K. (2015). Shovels and swords: How realistic and fantastical themes affect children's word learning. *Cognitive Development*, 35(1), 1–14. <http://doi.org/10.1016/j.cogdev.2014.11.001>.

Weiss, M. (2008). *Increasing receptive, expressive, and overall language skills in language-delayed preschool students* (UMI No. 3346418) [Doctoral dissertation, Nova Southeastern University]. ProQuest Dissertations and Theses database.

Whitehurst, G. J., Zevenbergen, A. A., Crone, D. A., Schultz, M. D., Velting, O. N., & Fischel, J. E. (1999). Outcomes of an emergent literacy intervention from Head Start through second grade. *Journal of Educational Psychology*, 91(2), 261–272. <http://doi.org/10.1037/0022-0663.91.2.261>.

Additional source: Zevenbergen, A. A., Whitehurst, G. J., & Zevenbergen, J. A. (2003). Effects of a shared-reading intervention on the inclusion of evaluative devices in narratives of children from low-income families. *Journal of Applied Developmental Psychology*, 24(1), 1–15. [http://doi.org/10.1016/S0193-3973\(03\)00021-2](http://doi.org/10.1016/S0193-3973(03)00021-2).

Whiteley, H. E., Smith, C. D., & Connors, L. (2007). Young children at risk of literacy difficulties: Factors predicting recovery from risk following phonologically based intervention. *Journal of Research in Reading*, 30(3), 249–269. <https://eric.ed.gov/?id=EJ771925>.

Whiting, E. M. (2006). *Enhancing Head Start children's early literacy skills: an investigation of intervention outcomes* (UMI No. 3261877) [Doctoral dissertation, Wichita State University]. ProQuest Dissertations and Theses database.

\*Whitlow, C. K. G. (2003). *Video self-modeling as an intervention for specific language impairment in preschoolers* (UMI No. 3095690) [Doctoral dissertation, The University of Memphis]. ProQuest Dissertations and Theses database.

\*Wilcox, M. J., Gray, S. I., Guimond, A. B., & Lafferty, A. E. (2011). Efficacy of the TELL language and literacy curriculum for preschoolers with developmental speech and/or language impairment. *Early Childhood Research Quarterly*, 26(3), 278–294. <https://eric.ed.gov/?id=EJ924085>.

Wilhjelm, K. N. (2004). *Contexts for facilitating emergent literacy in typically developing preschoolers* (UMI No. 1418663) [Master's thesis, East Tennessee State University]. ProQuest Dissertations and Theses database.

Williams, S. E., & Horst, J. S. (2014). Goodnight book: Sleep consolidation improves word learning via storybooks. *Frontiers in Psychology*, 5(184), 1–12. <http://doi.org/10.3389/fpsyg.2014.00184>.

\*Willoughby, D., Evans, M. A., & Nowak, S. (2015). Do ABC eBooks boost engagement and learning in preschoolers? An experimental study comparing eBooks with paper ABC and storybook controls. *Computers & Education*, 82(1), 107–117. <http://doi.org/10.1016/j.compedu.2014.11.008>.

Additional source: Evans, M. A., Nowak, S., Burek, B., & Willoughby, D. (2017). The effect of alphabet eBooks and paper books on preschoolers' behavior: An analysis over repeated readings. *Early Childhood Research Quarterly*, 40(1), 1–12. <http://doi.org/10.1016/j.ecresq.2017.02.002>.

\*Witt, E. N. (2000). *Effects of reading styles on African-American preschoolers of disadvantage* (UMI No. 9998719) [Doctoral dissertation, Louisiana State University and Agricultural and Mechanical College]. ProQuest Dissertations and Theses database.

\*Wyant, A. B. (2008). *What type of extra-textual input is optimal for preschoolers' vocabulary learning during storybook reading?* (UMI No. 1454132) [Master's thesis, Villanova University]. ProQuest Dissertations and Theses database.

Xuan, Y. (2007). *Hybrid intervention to facilitate preschool children's narrative development* (UMI No. 3380802) [Doctoral dissertation, The Pennsylvania State University]. ProQuest Dissertations and Theses database.

Yeh, S. S., & Connell, D. B. (2008). Effects of rhyming, vocabulary, and phonemic awareness instruction on phoneme awareness. *Journal of Research in Reading*, 31(2), 243–256. <https://eric.ed.gov/?id=EJ791317>.

\*Yeh, S. S. (2003). An evaluation of two approaches for teaching phonemic awareness to children in Head Start. *Early Childhood Research Quarterly*, 18(4), 513–529. <https://eric.ed.gov/?id=EJ778645>.

Yoder, P., Camarata, S., & Gardner, E. (2005). Treatment effects on speech intelligibility and length of utterance in children with specific language and intelligibility impairments. *Journal of Early Intervention*, 28(1), 34–49. <https://eric.ed.gov/?id=EJ743068>.

Youngblood, C. K. (2017). *Kindergarten literacy readiness before and after HighScope implementation* (Order No. 10253695) [Doctoral dissertation, Walden University]. ProQuest Dissertations and Theses database.

\*Zhou, N. (2014). *Effects of multimedia story reading on preschoolers' vocabulary learning, story comprehension and reading engagement* (UMI No. 3669649) [Doctoral dissertation, Purdue University]. ProQuest Dissertations and Theses database.

Additional source: Zhou, N., & Yadav, A. (2017). Effects of multimedia story reading and questioning on preschoolers' vocabulary learning, story comprehension and reading engagement. *Educational Technology Research and Development*, 65(6), 1523–1545. <https://eric.ed.gov/?id=EJ1162090>.

Ziolkowski, R. A., & Goldstein, H. (2008). Effects of an embedded phonological awareness intervention during repeated book reading on preschool children with language delays. *Journal of Early Intervention*, 31(1), 67–90. <https://eric.ed.gov/?id=EJ818317>.

Ziolkowski, R. A. (2004). *Effects of an emergent literacy intervention for children with language impairments from low income environments* (UMI No. 3160696) [Doctoral dissertation, Florida State University]. ProQuest Dissertations and Theses database.

Zoll, S. M. (2012). *From "at risk" to "at promise": An evaluation of an Early Reading First project* (UMI No. 3522948) [Doctoral dissertation, University of Rhode Island]. ProQuest Dissertations and Theses database.

\*Zucker, T. A., Solari, E. J., Landry, S. H., & Swank, P. R. (2013). Effects of a brief tiered language intervention for prekindergartners at risk. *Early Education & Development*, 24(3), 366–392. <https://eric.ed.gov/?id=EJ1010582>.